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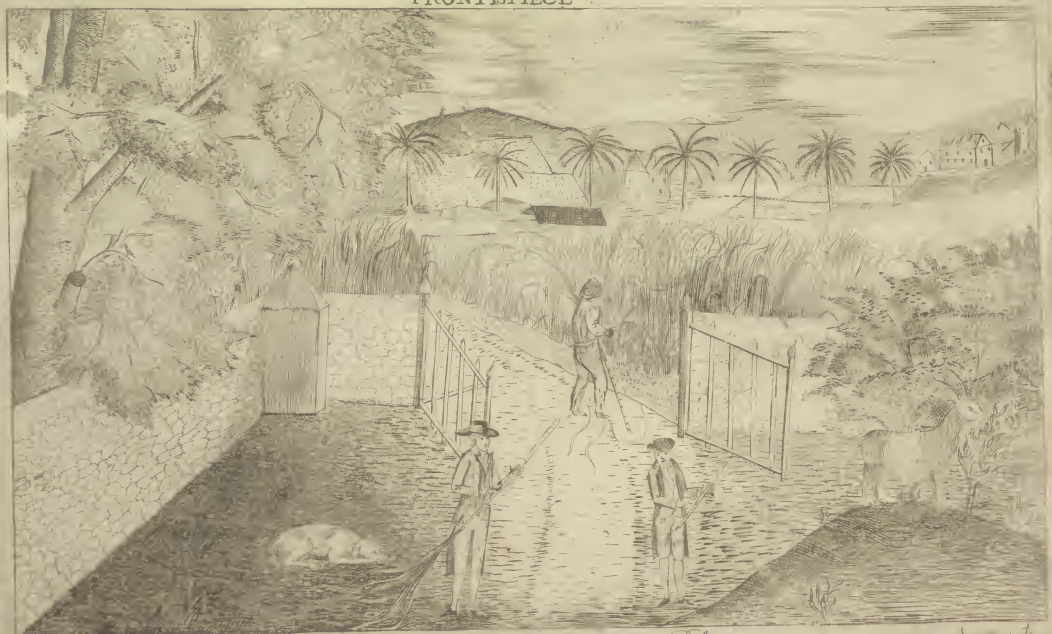

Here you may view the vast luxuriant Plains
The bounteous Mother of the teeming Canes.

Brooks Sculpt.

A

TREATISE

ON

PLANTING,

FROM THE

Origin of the Semen to Ebullition;

WITH A

Correct Mode of DISTILLATION,

AND A MELIORATION ON

The Whole Process Progressively.

DEDICATED TO THE PLANTERS OF THE

Leeward Charribbee Islands.

THE SECOND EDITION IMPROVED.

By JOSHUA PETERKIN, PLANTER.

ST. CHRISTOPHER's:

PRINTED BY EDWARD LUTHER LOW, CAYON-STREET, BASSETERRE.

M,DCC,XC.

1790

ERRATA:

PAGE 2 line 5—*for* calx—*read* calyx.
6—*for Corrola*—*read Corolla.*
3 15—*for* actions—*read* action.
5 last line—*for* kermaphrodito—*read* hermaphrodito.
8 3—*for* facharine—*read* saccharine.
33—*for* ferves—*read* ferve.
9 28—*for* thrash—*read* trash.
16 the catch word—*for* their—*read* canes.
21 line 8—*for* inteſtion—*read* inteſtine.
28 20—*for ſtrata*—*read ſtratum.*
33— do. do.
29 24—*for ſupra*—*read ſuper.*
33 24—*for* looms—*read* loams.
34 23—*for* alkalia—*read* alkali.
35 28— do. do.
30— do. do.
37 3—*for* oleagenous—*read* oleaginous.
38 21—*for* alkalia—*read* alkali.
41 13—*for* mowed—*read* moved.
21 22—*for* mowing—*read* moving.
44 16—*for Philanthropos*—*read* philanthropiſt.
20—*for* acquaticus—*read* aquaticus.
47 19—*for* ſenſation—*read* vegetation.
50 22 23—*for* ſatisfaction—*read* ſatisfaction.
the catch word—*for* particularly—*read* particularly.
52 10 11—*for* mucilagenous—*read* mucilaginous.
24—*for* aralable—*read* arable.
53 9—*for Palma Nobles*—*read Palma Noblis.*
54 16—*for* aquæous—*read* aqueous.
57 19—*for* Coudex—*read* Caudex. *For* frondoſus—*read* frondoſo.
27—*for* Coudex—*read* Caudex.
60 9—*for* Sacchariun—*read* Saccharum.
70 8—*for* aſſiſtance—*read* aſſiſtance.
76 11—*for* calx—*read* calyx.
82 3—*for* elambic—*read* alembic.
84 17—*for* fixed—*read* fixed.
91 22—*for* half—*read* half.
92 4—*for* retaine—*read* retains.
96 6—*for* elambic—*read* alembic.
97 6— do. do.
99 19—*for* empyreum—*read* empyreumatic.
laſt line—*for* elambic—*read* alembic.

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Page i.—*After* Brown, Hon. John, Esq. —*read* Brown, John, Esq.

Page ii.—*After* Hart, Henry, M. D.—*read* Henderson, Magnus, Master of the Ship Susannah.

DEDICATION.

TO THE

PLANTERS

OF THE

Leeward Charribbee Iſlands.

GENTLEMEN,

IMPROVEMENTS in the flouriſhing Art of Planting being of the utmoſt importance to yourſelves, I truſt you will favour this Treatiſe with a peruſal: Your unremitted endeavours to aſſiſt thoſe Improvements, will be the unbiaſſed ordeal by which it will either be found worthy general acceptance, or be conſigned to oblivion.

Believe my aſſurance to you, Gentlemen, that I would not have publiſhed theſe ſheets, unleſs I had conceived the fulleſt idea, that matter of Information may be collected from them, in ſuch a degree as to deſerve your Approbation and Patronage.

I am far from preſuming to hope that this Treatiſe is in every particular complete, or that a critical eye, on a Subject ſo really intereſting, will not eſpy defects: To which I can ſafely reply, that it was the product of leiſure hours, which I was perſuaded to believe,

lieve I could not better employ than in a work of this ſort, which has been ſo long wanted, and ſo loudly called for:—To this let me add, that I have ſpoken from a long experience, and a ſedulous attention; that I have, as far as recollection dictated, preſcribed thoſe variations of practice neceſſary for the difference of ſoil, ſituation, &c. and that I have, as far as my Abilities at preſent extend, aimed at deſerving your Protection.

I am,

GENTLEMEN,

Your moſt obedient, and

devoted humble Servant,

Joſhua Peterkin.

A

TREATISE

ON

PLANTING.

A Botanical Description *of the* Saccharum Officinarum.

THIS valuable genus of plants, according to the Sexual syſtem of the indefatigable Linnæus, belongs to the third claſs *(Triandria)*, and the ſecond order *(Digynia)* of the vegetable kingdom. The flower of this plant conſiſts of three *ſtamina*, or the huſbands of the flower. It is compoſed of two valves, equal in ſize, and without auns, which are of a lanceolated form, hollowed,

ed, erect, and acuminated: There is no *pericarpium*, each flower containing one ſeed, narrow, oblong, and acuminated; the parts of fructification are entirely unſheltered, there being no calx to ſupport the delicate *Corrola*, wherein the organs of generation are placed; and it often happens, at the time when the arrow is at maturity, that the weather proves tempeſtuous, and a haſty diſſipation of the *farina fœcundans* before the female parts, or *ſtigma*, are ready for impregnation; ſo the *farina* being diſperſed, which is the origin of the vegetable world, ſometimes conveyed by chance into the matrix of ſome other *germen*, becomes a monſtrous production; the ſame as the mule in the animal world. The cane is a graſs by nature, *gramen geniculatum*, which is the cauſe the young plants are not ſeen; for it muſt be an inſpective eye to diſtinguiſh them from graſs.

The very idea of nutrition implies propulſion of humours, and of courſe the *idea of life;* but vegetables derive their nouriſhment from the earth, *air*, &c. and conſequently muſt be conſidered as living creatures, it being fully evident, agreeable to a maxim of Doctor Harvey; *viz. Omne vivum ex ovo*, that every vegetable muſt derive its exiſtence from an egg: And as it is the diſtinguiſhing property of an egg to give birth to a being ſimilar to that which produced it,

it, the immenſe ſmallneſs of the ſeed of this genus, prevents it from being obſerved by the Planters: the manner in which theſe ſpecies are produced amongſt vegetables, greatly reſembles the generation of animals: the exiſtence and union of ſexes are neceſſary in the greateſt number of plants.—The labours of the celebrated Linnæus, have diſcovered a ſtronger analogy between the organs deſtined for this function in the two claſſes of organic beings; the *ſtamina* correſponds with the genitals of males in animals; the *embryo* is developed by the actions of the fecundating powder; without which it is not capable of producing an individual.——Another thing worthy obſerving in ſeeds, and argumentative in providential deſigns, is that pappoſe plumage growing upon the tops of ſome of them, whereby they are capable of being wafted with the wind, and by that means ſcattered and diſſeminated far and wide.

Semen unicum, oblongum
Anguſtum, acuminatum:

So that the ſeeds, after diſcharged from the arrow, become in a ſtate of vegetation, with their fibres tolerably fixed in the ground, and fit to abſorb the juices thereof. We are certain all ſeeds have

a ſeminal plant, perfectly formed, the ſame as the young are, in the matrix of animals. Nature hath endowed moſt ſeeds with a laſting vitality, in caſe of accidents, to preſerve their ſpecies; but the canes being often hoed, the tender plant is cut down by the negroes. There are two ſpecies of this genus; *viz.*

Saccharum officinarum;
Saccharum ſpicatum.

It conſiſts of two ſtyles, which are two little ſyphons, that convey the *farina fœcundans* into the matrix of the *germen*. By the force of nature, after it is diſcharged from the *antheræ*, the little veſſels become elaſtic, burſt, and diſcharge that prolific *pollen*. It is conveyed often by the inſect claſs, which act as hand-maids to Nature in ornithology, that beautiful genus of birds *Trochilus*, but in particular the *minima*. Its proper food is the *nectarium* of the flowery nation and animalcules, *mellevora avis minima*. Theſe little hummers, in ſearching out their natural rarities, gorge themſelves with honey-juice, and their delicate bodies become odoriferous; their little probes get ſet all round as with ſome fine topaz of a ſhining yellow colour, which is that prolific duſt the *farina*. They act as impregnators, and by chance convey the male

male duſt to the ſummit of the ſtyle or *ſtigma*, which is the occaſion of hybridous generations, in this kingdom of nature.

Sac. floribus paniculatis
Sac. floribus ſpicatis foliis undatis.

TRIANDRIA.

Mariti tres in eodem conjugio
Stamina tria in flore hermaphrodito.

A TREATISE

A DESCRIPTION *of the*

BORER,

OR THE

PHALÆNA SACCHARIVORA:

according to the *ſyſtemæ naturæ*.

THIS genus of inſects is arranged by Linnæus in the diviſion of Natural Hiſtory, in the claſs *Lepidoptera*.——This ſection is compoſed of inſects with farinaceous wings, the four wings being coloured by a ſcaly powder, theſe have a trunk more or leſs long, and often of a ſpiral form. The phenomena which the inſect claſs goes through, is very aſtoniſhing to the human mind, and conſiſts in the changes of ſtate through which they paſs, or the metamorphoſes they are ſubject to.——There are ſome inſects, and almoſt all the claſs of *Aptera*, which do not undergo theſe changes; but the greateſt number are ſubject to them. This deſtructive inſect does not come out of the egg with the form of the parent, but in that of the *larvæ*, or caterpillar: it is during the firſt ſtage under this kind of maſk, and it is then they commence thoſe depredations, which, accompanied with ſucceſſive dry weather for theſe four years paſt, have laid waſte

waſte all the Leeward Iſlands; particularly the windwardmoſt parts, which have ſuffered moſt: When it has grown to its full magnitude, it changes its ſituation for the ſecond ſtage, and no longer appearing under the form of the *larvæ*, aſſumes a different form called the *nympha*; though amongſt all the mutations of Nature, which deſerve our attention, none appear more ſurpriſing to the generality of mankind, than that by which a *larvæ* aſſumes the form of a winged animal; in this ſtage, the little animal lies like the flower in its bud: The third ſtage it aſſumes the formation of its parent; the nymph, therefore, during the firſt day of its change, is deprived of its limbs, by being confined in an aurelian ſtate; then all his employment is in generating its ſpecie, after getting clear of the coat of mail; for all animals are diſtinguiſhed by two modes of exiſtence, (that of motion, and that of reſt), which alternately ſucceed each other. This borer is longer in the chryſalis ſtate than in any of the other ſtages; and in twenty-five days paſſes through its gradation.

This deſtructive inſect is about one inch long, and not thicker than a large needle, of a brown fleſh colour: they attack the cane in various directions; frequently in the roots, and bottom of the origination of the joints, and eat their way up the *culmus*, and then finds

a proper *latibulum* in the middle of the *alburnum*: This den which they make, retards the aſcent of the ſacharine juices, a ſtrong fermentation enſues, it paſſes through the firſt ſtage, and commences the *aceteus*.—After this, no alkali can correct the redundant acid; and no chryſtalization can be obtained.—This was the caſe upon the Needs-Muſt eſtate of William Woodley, Eſquire, in Saint Chriſtopher, as alſo part of other concerns adjoining, where every precaution was taken; but owing entirely to the baneful effects of the borer, together with dry weather.—On the eſtate of Edward Huggins, Eſquire, in the Iſland of Nevis, the cane juice required nine grains of ſtrong cauſtic alkali, to ſeperate the redundant acid in one pint of it: every Planter may judge the ſtate of that juice!

The body of the borer conſiſts of twelve *annuli* or ſections, which are nearly of an equal ſize, only ending blunt at both ends: the head is of a dark reddiſh colour, and the body of a light brown. ——On the firſt *annuli* from the head, there are five ſhort horns, three of which on the back, and one on each ſide declining backward. Each ſubſequent ſection is ſet with five ſhort horns, three on the back, and one on each ſide; the laſt four briſtles are larger than the others, and ſerves for a flap to cover the *anus*. On the *abdomen*, next to the head, the three firſt *annuli* are ſix *papillæ*, three on each

each ſide, and in the middle there is no *papillæ*; on the four laſt *annuli* there are eight *papillæ*: the whole of this deſtroyer is furniſhed with fourteen feet: the *roſtrum* is of a reddiſh colour, with five hard briſtles, which he pierces the tender plant with.——No Naturaliſts that I have examined, have ever made it their ſtudy to give the leaſt deſcription of this ſpecies of inſect; ſo that it appears to have been in being but a few years paſt—*Confido in Domino* that they will ſoon depart!

I ſhall now take notice of a method of putting a ſtop to ſome of the three ſtages of that pernicious inſect, the *phalæna*, or borer, and the blaſt:——In my peregrination through the Leeward Iſlands, I ſaw a piece of canes that had been entirely deſerted by the borer and blaſt, which produced a very luxuriant cane, and on the approach of a dry ſeaſon, they returned in a much greater degree than formerly; in the attack they multiplied exceedingly.——To prevent that bold invader on the ſame land, the piece was entirely ſtooled up, and a ſufficient quantity of field thraſh burned ſuperficially: this did effectually deſtroy a great deal of the borer and blaſt, likewiſe the grub, which is the *larvæ* of an inſect very often deſtructive: They are of two ſpecies, one of which is frequently taken for the real borer, being much in the ſame ſituation.

When thoſe calamities attack a country, the canes ought to be planted thinner than in common. I am ſtrongly of opinion that thick planting prevents a free circulation of the ambient air, which is very deſtructive. The mode of planting termed *alternate*, would be very proper, when the ſeaſon will permit, in low prolific ſoils, and ſubject to be moleſted by thoſe inſects; there muſt be a ſpace left half the breadth of a row between each, ſo that the third remains fallow: It will anſwer in rich ſoils, to leave every third row unoccupied, which denominates *double alternate* planting: this will be ſufficient for the air to circulate, and when the canes are luxuriant, and in their infant ſtate, theſe intervening ſpaces between the double rows, will admit a free paſſage for adminiſtering what may be thought of the greateſt utility in ſaving the canes, and in traſhing or taking off the mortified canes, which hath been affected by thoſe inſects, with the weeds, may be laid in thoſe ſpaces in heaps, and a portion of ſulphur ſtrewed over on each quantity, and ſet on fire. The diſeaſed parts muſt be cut cloſe to the ground, and the roots covered with freſh mould; if the ſeaſons following be any ways favourable, it will ſend forth a luxuriant ſhoot.——I think this method will ſeldom fail to prove an ante-ſceptic for vermin.

A Method *of deſtroying the* BORER *by* FUMIGATION.

IT has been a practice in England for deſtroying inſects by fumigating bellows; it is a very ſimple operation, and free from danger. Two or three old negroes, either male or female, will be ſufficient to fumigate a piece of canes in one day, if not too large; it is attended with very little trouble, and the expence of it is very trifling. The negroes who perform this operation, cannot receive the leaſt injury from it: After charging the bellows with the ingredient, which muſt be tobacco, and putting fire to it, and ſcrewing the machine as cloſe as poſſible, one negro muſt be employed in each row of the canes, keeping the bellows at the bottom of them, and blowing along in this poſition, beginning at the windward parts of the canes, ſo that the effluvia may circulate through them; the oftener this mode is adopted the better: This fire inſtrument will diſcharge a great quantity of the effluvia of this cauſtic volatile alkali ——This method is very much approved of in the animal world, and is very remarkable for deſtroying the cutulaneous inſects. —I have been an eye-witneſs to this operation, and have ſeen it prove ſucceſsful: There is not the leaſt danger to be apprehended from it.——This mode may

be alſo adopted in orchards, where the fruit trees and other plants are infected with theſe animalcules.

Habitat India Occidentalis,
Intra culmo Saccharum.

Fumigating with the effluvia of tobacco, proved an ante-ſceptic.—When the orchard is to undergo this operation, it is neceſſary that a covering of any ſort ſhould be put on the tops of the tree, to retard the aſcent of the cauſtic effluvia, provided the trees are a diſtance from each other: If they project over each other, the leaves will anſwer the ſame effect.——This inſect is called the blaſt; and is ſo ſmall as not to be perceptible without the help of a glaſs.—Its colour reſembles that of gold and is a delicate animalcule; the *niduli* is like a very ſmall ſcale, which they move at pleaſure on their backs: they adhere ſo very cloſe, that it is difficult to diſengage them from the *epidermis*: The aſcenſion of the corroſive vapour, penetrates ſufficiently to deſtroy them almoſt inſtantaneouſly. The generation of the numerous tribes of inſects, always acted and directed by nature, to caſt their eggs in ſuch places as are moſt accommodated for the excluſion of their young, and where the food is ready for them, as ſoon

ſoon as they are hatched: Nay, it is a hard matter to prevent ſuch inſects from ſhedding their ſeed in ſuch places.

The time of performing this operation muſt be when the atmoſphere is nubilated, as the evaporation would be too copious, when the air is not loaded with vapours; as the diſſipation of the cauſtic fleecy effluvia will be too rapid:—The more the atmoſphere is depreſſed, the retardation will be the greater.—The ſmoke of the *necotianæ* will remain longer, and conſequently the eaſier the inſects will be deſtroyed, as they cannot breathe freely. Inſects in general have no lungs; theſe have two tubes or *trachæ*, placed along the back, and on each ſide iſſue forth ſmall tubes, that terminate at the latter part of each wing, by a ſmall clift called *ſtigma*: Theſe *ſtigmata* appear rather to be deſigned to emit ſome elaſtic fluid, ſince inſects do not quickly die *in vacuum*, although they have convulſions, and expire. In a few inſtances, if the *ſtigmata* be covered with an oleaginous ſubſtance, the effluvia will ſuffocate them, in a damp atmoſphere, ſooner than a ſerene one.———The fumigating bellows are to be had of Mr. Green, Floriſt to her Majeſty, at Kew; the ſizes of them are different, and may be had to contain from one to two pounds weight of tobacco.

A SPECIES *of the* GENUS FORMICA.

THIS inſect eats its way through the tender plant, and proves very pernicious both to juice and vegetation: it belongs to the claſs

Hymenoptera, Formica minima Saccharivora
Corpus adſperſum pilis albidis;

and depoſit their eggs, and hatch their young in them. This ant proclaims war wherever it meets the borer, but deſtroys the *alburnum*; ſo that the cure is full as bad as the diſorder. A few days ſince I made this experiment, by putting a borer in each ſtage, concealed in the cane, into a glaſs globe, together with a few of the ants, which I ſoon diſcovered began to devour the borer, and proved pernicious to the cane.

FORMICA OMNIVORA.

Corpus teſtaceum minutiſſimum
Habitat radix Saccharum.

The partial appearance of theſe inſects on particular ſpots, and their aſtoniſhing increaſe, can no more be accounted for

for than their ſudden decreaſe; unleſs we ſuppoſe, what indeed I think not at all improbable, that there was ſomething in the ſoil of theſe ſpots, which not only attracted them, but alſo was favourable to their propagation:—When this was exhauſted, the decreaſe of theſe inſects would be a natural conſequence.

But it is of much greater importance to diſcover in what manner the miſchief is done by theſe ants, in order that we may be enabled to find out a remedy for it.—All the experiments which it has been in my power to make, have ſerved to convince me, that the origin of the diſeaſe is at the roots of the plants, that is to ſay, in the ſoil itſelf, and therefore it is there the remedy ſhould be applied. Whether the ſoil is deprived of the principles of vegetation by the ants feeding on its richeſt juices; whether theſe inſects communicate a poiſonous acid to the earth; or whether, from their very great and almoſt incredible increaſe, it is ſo much pulverized, as to be rendered unfit for the culture of the cane, a rich compoſt would, in my opinion, at leaſt counteract their operations, (if it ſhould not prove an effectual remedy,) by reſtoring to the ſoil that power which it had loſt, by any, or by all of theſe means.

The ſterility of the ſoil, thus impoveriſhed, muſt require a richer manure than is commonly uſed by the planter.

I recommended marle as an excellent manure for lands infeſted by the cane ants, with greater confidence, from having tried it as far as my power of experiment could go; and found the cane to ſucceed beſt with the marle, which I had put in two of the holes. In this experiment, it muſt be confeſſed, I found, that the oily mixture, added to good dung, did not ſucceed better than the dung without it; but this might be owing perhaps to an error in the proportion which was uſed.

Then let the learned Planter mark with care
The kinds of ſoils, and what thoſe kinds will bear.
VIRGIL'S GEORGICS.

To lay out Cane-Plots.

CANE-PLOTS, where it can conveniently be done, ought to be oblong ſquares; the drains to run the length of the plot from eaſt to weſt, and the ridges acroſs from ſouth to north; by this means, the water runs ſoon off the plot into the drains, which ſhould be large enough to diſcharge it as faſt as it collects, being laid out long and narrow. Begin to cut at the far end of the plot: The carts may carry off the canes without croſſing any trench, but the interval or main drain, which may be filled with their

cane-trash if required, and the carts shift their track every breadth that is cut, which will preserve the trenches and the stools of the canes. Six or eight chains are as wide as a cane-plot of land ought to be, but as long as convenient, and in proportion to the size of the estate.

It is also needless to suggest the expediency of planting the cane pieces of a plantation in exact squares, so that the intervals may intersect at right angles; since such regularity is not only more beautiful, more safe in case of accidental fires, and a better disposition of the whole for dividing or planting one third or fourth part of a plantation every year, but also much easier guarded by a few watchmen; for one of these walking in a line from east to west, and the other from north to south, look through every avenue, where the most subtile thief cannot escape the watchful eye: And if the intervals surrounding the boundary of a regular plantation, be made twenty-four feet wide, the proprietor will receive ample recompence for so much land, by the security of his canes from fires kindled in his neighbourhood, and by planting all that land in *musa paradisica* (or plantain trees), which may at once yield food and shade to the watchmen, who by that means can have no excuse for absence from their proper stations.

I am now leading you through the whole proceſs of cultivating the cane, and manufacturing its valuable productions *(ſugar* and *rum)*: But in doing this, I have avoided a detail of many minute circumſtances, as well for the ſake of brevity, as becauſe I did not think it neceſſary to take up either your time, or my own, in explaining or deſcribing what every young Planter muſt be thoroughly acquainted with.

Where the land is new, or very rich, that you expect ſeveral ratoon crops, it would be adviſeable to adopt a plan, that ſome of the Weſtmoreland (a Pariſh in Jamaica) Planters have introduced, *that is*, to carry the canes off the field by negroes to the interval, which is eaſy done where the plots are laid out narrow: The advantage of preſerving the trenches and ſtools, particularly in wet weather, pays amply for the extra labour: Where the lands are high and dry, it is not ſo neceſſary.

Trenching.

MOST level land, in many parts, and eaſy hilly land requires to be trenched; brick mould ſeldom requires it; on all light ſoils it is prejudicial. In trenching, care ought to be taken to run the ridges acroſs the fall, to prevent as much

as

as poſſible the ſoil being waſhed away, which is too frequently the caſe, by the land being injudiciouſly laid out. The common way in trenching level land, is to ridge from fourteen to twenty-four feet wide, with the trenches from eighteen to thirty inches; but it is the opinion of good Planters, that fourteen or ſixteen feet ridges are beſt, with trenches twenty or twenty-two inches wide; where the ridges are wider, it requires to be ridged up to the middle: The earth required to do that properly being taken off the ſide of the trench, impoveriſhes that part of the land; the cane on the piece will be of an uneven growth, and you will frequently ſee a ſpace of ſix feet from cane to cane, which is a ſeminary for weeds, and takes more labour to clear them, and if neglected, ſtagnates the water, and chills the adjacent fibres:—Another diſadvantage ariſes from wide trenches, the carriages and ſtock paſſing and repaſſing them in the crop, break them up, and deſtroy the ſtools of the canes on the banks.

When the land is laid out in narrow ridges, the mould taken out of the trenches will raiſe it ſufficiently to throw off the water, and, being divided into a number of ſmall ſtreams, does not run off the ſoil. The land of the ridges being equally good, produces a regular growth of canes, which come to maturity at the ſame time.

Trenching new Land.

THAT which is level requires to be trenched, as it can only be done ſuperficially, for the number of roots that intervene, till they begin to rot; then it is advantageous to widen and dig them, and ſpread the mould over the ſtools, which adds to their vegetation, and will make one half more returns than they did the crop before: This may be repeated every four years, as the trenches in that time will collect traſh. By this method, the canes will ſtand twice the time they do in the common way of treating them, and this ought to be well done for from *Three* to *Four Pounds* an acre, if a jobber is to be employed. Some Planters in Weſtmoreland (Jamaica) have tried a new method of planting land that is very rich, and the canes apt to lodge: They hole the land, as uſual, in the month of July, and plant in Auguſt, and in the beginning of September, clean them frequently, and give them a little of the bank till January; then they cut the young plant cloſe to the ground with knives, and level the bank on them; they ſoon ſend out a number of luxuriant ſhoots, all of an equal growth, and their fibres having a good hold of the ground, ſtand the common winds, or the accidents of nature, which are too frequent

quent in theſe Iſlands. It is obſerved, that the canes make better returns by this method, from land that made very little when planted in the common way; but this will only do where the land is very rich, or highly manured.

Dung, which is ſuppoſed to act by fermentation, cauſes indeed an inteſtine diviſion of the particles of the earth; Dung attracts inſects, thoſe inſects gnaw plants: It is well known that the roots of canes in high manured lands, are very liable to be injured by inſects; and this is one of the chief reaſons why Floriſts baniſh dung from the gardens; for the different *larvæ* of inſects, and other ſuch like vermin, make dreadful havock. It is true that dung is equally ſerviceable to light ſoils and to ſtrong; but the ſame may be ſaid of hoe-ploughing land, that it is too ſtrong, when its particles lie too cloſe together, that the roots of plants cannot extend between them, through great difficulty, in queſt of their nutriment, for want of which they will remain languid; but when the ground has been well looſened by repeated hoe-ploughing, and its particles are ſet at a diſtance from each other, thoſe roots will be able to ſpread freely on all ſides, to pervade every minute chaſm, and to collect ſuch quantities of food, as will make the plant grow luxuriant; the friendly influence of the atmoſphere will then penetrate the lower

er receſſes of them. What plainly proves the good effect of ſtirring ſuch ſoils, is, that their fertility is ſometimes augmented by a mixture of ſand inſtead of dung:—Now ſand does not afford any nutriment, but only obſtructs the particles of the earth, from re uniting too cloſely. Hoe-ploughing is equally beneficial to light ſoils, for the very contrary reaſon, though they do not require ſo much of it as the others. There is no danger of their being exhauſted by any expoſure to the ſun; but on the contrary, they require an additional degree of fertility, by the frequent movement of their particles, and are thereby ready to receive the production of the clouds, and the ſalutary influences of the air and ſun, whilſt the inward pores are at the ſame time better adapted to the proper extenſion of the roots of plants.—The ſecrets of vegetation are carried on by roots, and the uſe one part of the root is of to the other parts, are yet far from being underſtood to perfection; we know, indeed, that all roots imbibe moiſture from the earth

Fallowing is of incredible advantage to every ſoil, not only by being divided into the minuteſt parts, but alſo by imbibing thoſe vegetative powers, with which the air is impregnated by the bountiful hand of the great architect of Nature, who is

Maximus in minimis.

Holeing.

Holeing.

For the greateſt part of the groſs ſalts in the moſt rotten dung, are nearly of the ſame ſpecific gravity with *Rain Water*, if not equal, and then they incorporate with it and, in all caſes, partake of its motion downwards, ariſing from the central attraction of the Globe of the *Earth*, and, by this means, are carried quite away with it from the ſoil, and alſo partaking with the motion of the current, where there is any, the ſoil ſuffers an additional loſs. The volatile parts of ſuch dung will be affected as in the caſe of virgin mould, and the groſſer parts, being ſpecifically heavier than *Water*, will remain, it is true, but the bulk of the goodneſs is gone, in the loſs of thoſe ſalts, which are of the ſame ſpecific gravity with the *Water*: And from hence we may ſee the advantage of reducing, or bringing ſuch light land into vegetative heart, by making them virgin mould, as by the deſcent of ſoaking heavy rains, or by the nature of the more uſeful parts of ſuperinductions not only are carried away, which is the firſt loſs; but alſo, the crop is deſtroyed, for want of a ſufficient nouriſhment, which is a detriment much beyond the firſt, and both together, a great diſcouragement to the owner, who,

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perhaps, wonders how he could be deprived of his juſt expectation, when he had in the moſt huſband-like manner, prepared his light grounds, and filled them full of good rotten dung, and had, beſides, a favourable ſeaſon, throughout the time the plants had been upon the ground, and only remembers ſome heavy rains had deſcended, or one inundation had happened.

The common method of preparing land for planting is, to dig it into holes from three to four feet and a half, agreeable to the fancy of the Planter. Let them ſtand till the ſun and rain pulverize them properly, then plant, ſome one, ſome two canes in the hole. The number of canes required depends upon the nature of ſoil: On all light ſoils the canes throw out a number of luxuriant ſprouts; therefore one cane in a three-and-a-half-foot hole is ſufficient, and two canes in a four-foot hole. Stiff land, as it does not throw up ſo many ſhoots, requires to be planted thick.

The common way of planting ſtrong land is, to put two canes in a four-foot hole, about eighteen inches aſunder; but of late, ſome Planters have found it anſwer, to put the canes ſix inches in the middle of the hole, which leaves room to hoe-plough the ſpace, without injuring the young fibres, and admits of a free circulation of air to bring the juices to maturity. Although holeing

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is very neceſſary on moſt ſoils, it is very prejudicial on others; where the ſoil is light, and in dry pariſhes, the land being ridged, attracts the rays of the ſun, and reflects them into the holes, which burn the young plants, and the bank retains any ſmall ſhowers that fall, without being of any benefit to the young plants, and, if the ſeaſons are heavy, waſhes the bottoms of the holes; whereas, if the land was ploughed, harrowed, and levelled, the plants would reap the benefit of the ſmalleſt ſhowers, which enrich the land where it is level; for all rain-water contains in it a copious ſediment of heterogeneous matter, which ſerves for the nouriſhment of the plants, and not the water itſelf, which is but a vehicle to drive the nutriment to all parts of the plant: However, it is certain, that water is not a ſimple body, but is capable of decompoſition, and therefore, the more rain, the more of this nutritious matter may be precipitated on the ſoil, and thereby rendered more fruitful. It is the opinion of moſt Naturaliſts, that rain-water is endowed with ſome vegetating or prolific virtue. Moderate ſhowers precipitate by degrees, ſo the fibres may abſorb the nutriment regularly; for the roots in the vegetable world have been obſerved to do the offices of the ſtomach in animals, *that is*, to make the firſt and principal digeſtion of the alimentary matter: Naturaliſts have

ſhewn, that the root does the office of all the parts in the belly of animals deſtined for nutrition. Land, planted level, may be cleaned, and the ſpace hoe-ploughed, in the ſame time that the cane-holes could be weeded properly, and the canes moulded.

Ploughing.

The plough has been uſed with ſucceſs in many parts of Jamaica, but particularly in Weſtmoreland, and all the leeward parts; likewiſe on the level parts of St. Domingo. Some Planters there, by cultivating the land with the plough and harrow, raiſe canes ſuperior to what they uſed to do by holeing only, and with much more eaſe to their ſlaves; for there is no plantation-work ſo laborious as digging cane-holes. In ploughing the land, they level the ridges, and fill up the ſmalleſt trenches. Harrow and retrench it into ridges of ſixteen feet, raiſing the ridge very little, then open a hole ſix or eight inches wide, with a foot aſunder, and as deep as neceſſary; put in two plants, and cover them light, leaving a ſmall bank to mould the young ſhoots, when they are about a foot high, the ſpace being generally looſened with hoes till they begin to ſhade the ground: After that, it would

would be improper to dig the ſpaces, as it would injure the roots. Land being levelled ſoon after planted, ſends up a number of ſhoots, and nearly of an equal growth, which come to maturity at the ſame time; the ſpaces being well pulverized, the fibres penetrate, and leave no part unoccupied, and make the plants ſtrong and ſucculent, and, by having a good hold in the ground, ſtand the tempeſtuous weather better than thoſe planted in the common way: Where there is not a ſufficiency of ſtock to plough with oxen, to hoe-plough deep and harrow will, on moſt ſoils, anſwer better than the common method of holeing, and can be done at leſs expence: —Twenty able negroes will hoe-plough an acre of land, as ſoon as thirty will dig it into holes; the expence of harrowing and opening narrow holes for the plants will not be ſo much as the extra labour of holeing. Where the land is holed, the banks ought to be levelled as ſoon as the young plants will admit, that they may reap the benefit of the ſeaſons, and that the ſhoots may be nearly of an equal growth; for every time the canes are moulded, they throw out new ſhoots, many of them too late for ſugar.

The only thing againſt ploughing in the Leeward Iſlands, is the want of paſture: deep and looſe ſoils may be ploughed with a ſmall ſtrength of cattle; but

clay land in the torrid zone requires more ſtrength, than any plantation can rightly ſupport, without at a very great expenſe; for if the clay ſoil is either too wet or too dry, as is very often the caſe, ploughing is impracticable: In the Iſlands of Jamaica and Saint Domingo, where they have extenſive ſavannahs, ſome hundreds of acres, both in natural graſs, and *holcus*, or Guinea-graſs (the latter is a valuable exotic, and very lucrative), they can conduct the ploughing with eaſe, attended with very little expence. Ploughing is ſufficient to convince me, *that is to ſay*, that the particles are ſo divided, as to be very productive.

The Planter who intends ploughing his land, ſhould firſt examine the poſition and formation of the interior *ſtrata*, and then he may form a criterion, either to plough deep or ſhallow: It is natural to think that ſome upper *ſtratum* was originally compoſed of animal and vegetable ordure: On the eſtate of George Taylor, Eſq. in the Pariſh of St. George, in the valley of Baſſeterre, in the Iſland of St. Chriſtopher, celebrated for its fertility, (having made 270 hogſheads of ſugar in the year 1766, though thro' the badneſs of the laſt crop it produced but 22), at the depth of three feet, I found a thin *ſtrata* of *pumex volcani*; this I ſuppoſe at the diſtance of ſix miles from the crater in a direct line: I diſcovered this

porous

porous maſs, which had been formed by concretion, all round the Iſland. This muſt appear ſtrange to the reader who has not ſeen the phenomena—it is of vaſt extent; the many marks of ſo extenſive an eruption from this volcano, is very aſtoniſhing—'tis chiefly exhauſted.

Manure.

THE making manure is a heavy taſk on many eſtates, and requires as much attention as any branch of the planting buſineſs: Every eſtate has an opportunity of making a quantity with the refuſe traſh about the works, the tops that the ſtock are fed with, and the aſhes of the boiling-houſe, but in particular thoſe from the ſtill-houſe, as they are impregnated with more ſalts, the vegetables being green. Care ought to be taken to prevent the rain from falling upon them, which diſſolves the ſalts, and leaves an inſipid earth. Thoſe thrown together into the cattle-penns, and covered *ſtratum ſupra ſtratum*, then cover the whole with ſix inches of good mould, frequently during the crop, and thrown in a heap to ferment, make the beſt plantation dung; if the mould ſhould be but indifferent, it aſſiſts much by abſorbing the volatile ſalts, and eſſential oils, and rotting the traſh.

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In very ſtiff lands, there is generally ſuch a bottom, which the ſuperfluous water cannot haſtily pervade, if at all in ſome caſes; neither are the particles, or conſtituent parts of ſuch a ſoil, ſo ſoon ſaturated, and when they are, the effect is very different, from the ſame circumſtances in the lighteſt grounds: For, from the nature of theſe conſtituent parts of ſtiff lands, coheſion, acting with greater vigour when water enters the pores, ſhuts every thing cloſer up; the nutritive fluids and air within the pores, are preſſed cloſer together by this contractive power of coheſion, and the ſpring of the air is bent: Here the vegetative principles are locked up ſafe from all attempts to rob the plants of their food, and as long as the ſuperfluous water continues thus to beſiege them, they will not ſtir; but as ſoon as it is carried off by exhalation, the included air will recover its former ſtation, and thereby open the pores wide enough for the tubular inteſtices of the fibres to enter, and perform their wonted offices as before.

The ſtiffeſt ſoils being thus better adapted to preſerve the riches treaſured up in thoſe pores, are therefore entitled to be deemed the beſt land, provided the ground can be reduced to ſuch a degree of fineneſs, that the plants can come properly and readily at their nouriſhment; otherwiſe the thinneſt ſoils will produce

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a better crop, for it means nothing to them to have great magazines of provisions, if they cannot enjoy them; they are better pleased with what a good-natured thin soil supplies them with, tho' it be in a very scanty manner, than with what they receive from a surly clay, that locks up almost every thing, and no nourishment to be come at.

Lime is commonly said to enrich land greatly at first, but afterwards, when its efficacy is exhausted, to leave the ground more barren than it was before.

Lime readily unites with every unctuous substance, and renders it more soluble in water; by this means, all such particles mixed with the soil, may be more speedily converted to the nourishment of vegetables, than they might otherwise be: Indeed if the Planter's avarice, or want of judgment, tempt him to over-crop the ground, it may be left without matter fit to nourish plants, till a fresh supply is brought; but if it be judiciously cropped, and left in good heart for rattoons, or any other produce, the effect of the lime will be more durable, and more advantageous than is generally imagined.

The pure earthy part of dung in agriculture, is so very small, that after a perfect putrefaction, it bears an extremely inconsiderable proportion to that of the earth it is intended to manure; the fermenting quality of dung is principally owing

owing to the ſalt it contains, and yet thoſe or any other ſalts applied immediately to the roots of the plants, always deſtroy them: This proves that the buſineſs of the dung is not to nouriſh, but to divide and ſeperate that terreſtrial matter, which is to afford the nouriſhment to vegetables, through the mouths of their roots.

The ſupply of vegetable ſubſtance, in the place of that which was exhauſted by the ſucceſſive growths of plants, is done by ſeveral ways, but by none ſo well as by letting it lie fallow for ſome time; in this caſe, the rain falling upon it, the vegetable earth which this water contains, is depoſited in ſufficient quantities, and this alone is ſufficient to give nutriment to new crops, and it is proved by this, that the rain water, as well as other water, does contain ſuch earth as is neceſſary to vegetation: The other means of giving a ſupply to the exhauſted earth, is the manure laid on it by the Planter, and that is of ſome animal or vegetable remains, and their uſe is to drain into the earth thoſe particles from themſelves which may be again received into the bodies of new productions of the ſame kinds.

Common ſand is a very good addition by way of manure to all ſorts of clay lands, it warms them and makes them more open and looſe; the beſt ſand for the Planter's uſe, is that which is waſhed by

by rains from roads or hills, or that which is taken from the beds of rivers; the common ſand that is dug in pits, never anſwers nearly ſo well, ſand mixed with dung is much better than laid on alone, and a very fine manure is made by covering the bottom of ſheep-folds with ſeveral loads of ſand every week, which are to be taken away, and laid on cold ſtiff land, impregnated as they are with the dung and the urine of the ſheep.

It is acknowledged by Chymiſts, that there is no difference between the earth of animals and vegetables. If water be poured on aſhes, they acquire ſome degree of tenacity, ſo as to become capable of being formed into veſſels; but if oil be added, they cohere into a much ſtronger and compact maſs: hence it ſhall appear that oil and earth are the principals which give conſiſtence and tenacity to plants. The compound earths are of two *generæ*, firſt, the looms, compoſed of clay and ſand—and the moulds, compoſed of earthy and putrified animal vegetable matters. As vegetables derive more of their ſubſtance from the air and water, than from the earth, when they decay, they add more to the ſoil than they extracted from it.

Salts are bodies endowed with a great attractive force, though among them be interſperſed many interſtices, which lie open to the particles of water; theſe

are, therefore, ſtrongly attracted by thoſe ſaline particles, ſo that they forcibly ruſh into them, ſeperate their contracts, and diſſolve the texture of the ſalts. Foreſts attract and retain vapours and moiſtures; of courſe, in woody countries, the ſoil is much augmented. Mountains ſerve to ſtop the evagation of the vapours between the Tropics, condenſing them like the alembick heads, into rain, and likewiſe cooling and conſtipating them, and by thoſe means render the fervid regions of the torrid zone habitable.

What the Planters call *penning-over*, has been practiſed with pretty good ſucceſs, and does not injure the ſtock ſo much as ſtanding penns; but it will only anſwer on light ſoils and brick mould. Strong clay land requires dung that is well fermented and digeſted, with a mixture of aſhes; the attractive force of the alkalia towards the aqueous ſubſtance in the clay, pulverizing it the ſooner. In St. Thomas in the Vale, (Jamaica,) where they cultivate and manure their land higher than moſt pariſhes in that Iſland, and make the beſt dung, they have a double advantage, for the following reaſons: The nebulous atmoſphere aſſiſts the fermentation, and acts as a menſtruum to the alkalious ſubſtances, by the great attraction of the acidity in them, and therefore paſſes through the ſtages of fermentation the ſooner.

ſooner. They prefer the dung made on ſtanding penns to penning-over, their land being moſtly a coarſe black mould on clay, which requires ſtrong warm dung.

The ſpring adorns the cane, renews the leaves,
The womb of Nature the genial plant receives;
'Tis then Almighty Jove deſcends, and pours
Into his buxom bride his fertile ſhowers.

To make Dung by Standing Penns.

DIVIDE the piece you intend to manure, into plots of two acres; on each of theſe lots place a penn, in proportion to the number of cattle you intend putting into it; then ſtock up all the canes, graſs, &c. on the piece, draw them up into ridges, and throw them into the penn at three different times, moulding the penn from the interval, river-courſe or gully, between every traſhing. Vegetables which the Planter intends for manure, if poſſible, ought not to be cut till in flower; and in the curing the vegetable ſubſtances, great care ſhould be taken in digeſting them for dung; they muſt be covered with mould to oppoſe the evaporation of the volatile alkalia, otherwiſe, when fermentation takes place, too great a part of the volatile alkalia

will evaporate. Moulding prevents the vegetables in fermentation from taking fire, and the ſubtile particles from flying off. If there is not traſh enough on the piece, carry ſome from the adjacent fields, with graſs and tops to feed the ſtock. When the cattle have been their limited time on the penn, cover it over with mould, and let it ſtand till the traſh begins to rot; then hoe-plough it well, and throw it in a heap to ferment, and by the time the land is prepared for planting, the dung will be fit for uſe.

It's of the utmoſt utility for Planters to have a well-fenced penn, nearly ſituated to the works, cloſely walled in, and divided in the middle with a ſtone wall, and ſhaded on each ſide; one apartment for horſes and mules, and the other for the horned cattle: This diviſion often prevents many accidents which happen from the ſtock being altogether, and the ſhade is of great ſervice, both in tempeſtuous weather, and in the heat of day, which is very prejudicial. Let the foundation of the wall which is encloſed, be ſunk at leaſt two feet below the ſurface of the ground, which will make the building ſtand the longer; for every time the dung is taken away, ſome of the depth of the ground will be reduced: If poſſible, let your penn be ſituated on clay, as by that means the eſſential principles of the dung will be retained; but if the *ſub-ſtrata* of the penn be very looſe,

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the ſaline particles, according to their ſpecific gravity, will get out of the reach of the terran and oleagenous bodies: This is a great object in making a compoſt; the firſt layer ought to be of earth, about eight inches in thickneſs, over the earth lay one layer of wowra or magoſs, which may be moſt convenient to the Planter. Penning the ſtock as often as poſſible, is of great advantage, both from their well-digeſted excrement, and their urinary diſcharge, which is one of the firſt agents in the putrefactive ſtage, and this is the only ſtage of the three for dung-making: The third *ſtrata*, if poſſible, ſhould be wood aſhes and ruſty herrings, a layer of traſh, and ſo forth; after ſome time, the ſtock being as often in the penn as convenience will allow, then apply a thin coat of ſand, about three or four inches, but this is if the plantation be clay, which I have already given out. I muſt remark, that the firſt buildings for dung pens I have ſeen in the Weſt-Indies, are on the eſtates of John Sempill and P. L. Oxholm, Eſquires, in St. Croix, and Ralph Willett, Eſquire, in St. Chriſtopher's.

Well muſt the ground be dung'd, and better dreſs'd,
New ſoil to make, and meliorate the reſt.

To

To manure by Moving Penns.

YOU muſt make the penn in proportion to the quantity of land you intend to manure, by this method; *for example*, If you have thirty acres to dung, and four months to do it in, make the penn encloſe an acre of land, let the ſtock lodge on it four nights, and move it over; by this means, the land will be equally manured: Any part that is very poor, let the ſtock lodge on it ſix or ſeven days, and keep them a ſhorter time on the rich parts.

Though it is highly neceſſary to manure the land in moſt parts, yet it is prejudicial in others, where the ſoil is light, and in many places a mixture of marl, the ſoil itſelf being naturally warm, and that, being augmented by manure, burns the plant when the dry weather ſets in; for vegetable alkalia is impregnated with a ſtrong acid that attracts the humidity, and deprives the *radiculi* of the nutritious juices: When that is the caſe, to plough and harrow well, that the land may have the benefit of the ſeaſons, will, in ſome meaſure, compenſate for the want of manure.

Planting

Planting Canes.

The time of planting varies according to the ſeaſon in theſe Iſlands; but, in general, the months of Auguſt, September, October, and November, are the moſt proper for planting old land, and produce what the Planters call the *fall-plant*: February and March for ſpring-plants on old, April, May, and June, for new, land.

Canes planted in September, and the beginning of October, in general ſtand the high winds better than thoſe planted later: by their having the advantage of all the fall-ſeaſons, they grow ſtrong and ſucculent, and ſhade the ground before the dry weather ſets in, which keeps the roots cool, and the earth about them moiſt, and continues the vegetation; their being frequently traſhed before the windy months, hardens the plant, and makes them throw out light tops, which gives them a better chance to ſtand the common breezes, and, if they are lodged by ſtormy weather, have a bed of traſh to lie on, which will prevent them from receiving ſo much injury as they would otherwiſe ſuſtain. Canes planted late in the fall, loſe the advantage of ſeaſons; and the dry weather that generally happens the beginning of the year retards the vegetation till the ſpring ſeaſons, when they ſprout up with heavy tops

tops on a weak ſtalk, that is eaſily blown down, and by being full of ſap, they ſpring both at the roots and joints; ſo that by the time they are cut, few ſugar-canes are to be found.

The *ſcirpus hydra*, or knot graſs, which of late years hath made its appearance in theſe Iſlands, is productive of great miſchief, and great care ought to be taken to prevent its over-running them; for when it once gets a footing, neither the induſtry of the Planter nor the utmoſt exertions of labour can eradicate it, therefore it ſhould be the Planter's chief ſtudy: When he is unfortunate enough to meet that pernicious graſs, the ſpot where it makes its firſt appearance, ought to be dug up as deep as poſſible, and ſowed with ſalts, or well impregnated with a *lixivium*, of either marine or vegetable ſalts, which, in my opinion, partly will deſtroy it. This ſpecies of the genus *ſcirpus*, was brought firſt from the Iſland of Barbados to Antigua, merely on account of its beauty; but in my opinion, its native ſoil is South-Carolina, where I have ſeen it in great abundance; neither the ſeverity of the winter, nor the induſtrious agriculator and horticultator, can with all their ſkill, prevent its rapid growth: Antigua in particular is matted with it, the eſtate of the Honourable John Richardſon Herbert, and that of John Bott, Eſquire, being much infeſted with this deſtructive graſs; and, in

in like manner are all the low eſtates near the town of Plymouth, in Montſerrat, infeſted: I am informed by ſome very experienced Planters, that it requires ſixteen or ſeventeen times weeding, before the plant-cane ſhades the ground; all this time the knot-graſs is abſorbing the food which the cane ought to live on, and of courſe keeps the plant in a very weak ſtate. Some Planters are of opinion, that the knot-graſs does not hurt the land, for this reaſon—the ſpaces are ſo often moved by the frequent weeding, that it invigorates the fibres of the plant; but on the other hand, ſhould there be no ſuch plague, and the tender plant abſorb the nutritious juices, which belong to them, by Nature's command, whatever ſhould obſtruct the invigoration of thoſe juices, it is our buſineſs to eradicate if poſſible; the frequent mowing of the ſoil without doubt enriches it, and lets the roots ply at pleaſure; this ſhould be done without the help of this graſs. The judicious act of the Council and Aſſembly of Nevis, for preventing the importation of cattle from any iſland curſed with this new invader, is an exceeding good act: No doubt but all the Iſlands would have taken the ſame preventive meaſure, had they had the ſmalleſt idea of the danger they are ſo unfortunately plunged into.——Nature ſeems to have waged war with us;—the inſect claſs—the vegeta-

ble world—and the elements: ſo that this gainful genus of plants has to encounter with a great many enemies.

This plant belongs to the claſs *Triandria Monogynia* of Linnæus.

Radix Geniculatus.

The ways of planting Nature did ordain,
For canes, and plants, and all the ſylvan reign.

In light luxuriant ſoils, canes planted in April or May, are often very productive; but it ſeems not prudent to delay ſo long, for fear of diſappointment by drought. If the holes are made 4 feet wide one way, and 5 feet from bank to bank, the bottom of the hole will be a true ſquare.

The annual viſitors, hurricanes and inundations, which were too frequent of late years in theſe Iſlands, proſtrate the vegetable kingdom, inſtead of our moderate ſhowers we uſed to enjoy. Precipitating, among the vegetable claſſes, impels, by myſterious force, the nutritious juices, which are detached from the ſoil, and aſcend through myriads of the fineſt meanders, and transfuſe vegetative life into all the plants; but the devaſtation which attends theſe rich Iſlands, levels that beneficial genus of plants *Muſa*, and expoſes the canes, by being lodged, to the

the ravine of any vermin. The *Muſa* is the principal maintainance of the negroes in Jamaica, and all new ſettled Iſlands, and is, in my opinion, the ſtrongeſt food of any between the Tropics: It is a very valuable diſcovery, which Linnæus named in favour of Muſa Antonus, a Roman Naturaliſt; 'tis doubtful with me, if we ſhall ever meet with ſuch another, or if the much-talked-of *Artocarpus* will prove ſo beneficial. The *Sochum*, or bread-fruit, of the Iſland of Java, which now grows in Jamaica, as if indegenous, to the ſize of 26 pounds weight, is by no means to be compared to this uſeful fruit.

Alternate Planting.

WHERE the climate is ſo dry, and the land warm, that it will not take manure kindly, and on eſtates where they have not a ſufficiency of manure for all their land, to plant alternately may anſwer very well; the traſh and weeds collected on the ſpace enrich the ſoil, and are not apt to make canes burn, like animal ſalts.

One of the enemies to this tender plant is the *Mus*; it is of the claſs *Mammalia*, and of the order *Glires*, in the Linnæan *Syſtemæ Naturæ*. A very large ſpecies of this genus of quadrupeds, was

ſome years ago introduced by Sir Charles Price, in Jamaica, to deſtroy the ſmall cane rat, but they now over-run that Iſland, and prove more productive of miſchief than the *Mus Saccharivora*, and, another unfortunate event, the negroes will not eat them;—they go by the name of Sir Charles Price. Brown's Natural Hiſtory of that Iſland, arranges them in the genus *Caſtor*, which makes it a ſpecies of the beaver: But Mr. Brown muſt have made a miſtake, they being ſo nearly connected with the next genus in the ſame order. The ſpecies of rat that this good-meaning gentleman introduces as a *philanthropy*, is one of the greateſt deſtroyers of the cane we have in that Iſland:

Mus amphibius.
Mus major aquaticus.
Habitat in Europæ, Africæ, foſſis & radices arborum.

This rat makes great havock among the canes; they take the ſame method of killing them, as they do in the Leeward Iſlands. Theſe noxious animals attack the tender plant ſo rapaciouſly, that it retards the juices, and they imbibe ſo much acid, that the Planter can hardly, with all his ſkill, obtain a chryſtalization.

Of

Of Spring Plants.

PLANTING old land in the ſpring, is ſeldom attended with ſucceſs; it is done at a time when they might be better employed in taking off the preſent crop, and the cleaning, when they ought to be preparing for a fall-plant, or hoe-ploughing the ratoons; they ſeldom yield above half of what the fall-plant does, and the ratoons, from ſpring-plants, are never ſo good as thoſe from fall-plants; they are cut before they come to maturity, when the ſap is in the top, and leaves the root in an impoveriſhed ſtate. When the canes are full ripe, the ſap falls to the roots, and when cut, throw up ſtrong ſprouts. When the ſeaſons ſet in early, and put a ſpring in the ripe canes, has a ſimilar effect, which is the reaſon that canes cut in dry weather always throw up better ratoons than thoſe cut in wet weather; but the ſpring is the only time to plant new land, as it is generally ſo rich, that the canes would lodge if planted in the fall; and all plants come ſooner to maturity in new land than in old.

Planting New Land.

THE ſeaſon of planting, and the treatment of canes on new land not being well

well attended to, is the reaſon why many eſtates have ſucceeded but indifferently on their being firſt ſettled. The latter end of March and April is the time to plant new land, that is not very rich, and May and June for the land that is rich; if they are planted earlier, they are apt to lodge, when the north winds ſet in, not from the length of the cane, but the weight.

Cleaning Canes.

AS ſoon as the canes riſe a few inches above ground, they ought to be hand-wed, and it ſhould be repeated often, to prevent the weeds from ſeeding. Give them a little of the bank the ſecond cleaning, and level it the third; which ought to be done by the time the canes are four months old, and the ſpace hoe-ploughed. All lateral ſhoots, (commonly called ſuckers), that ſpring after they begin to joint, ought to be taken away, as they ſeldom come to maturity, and draw the nouriſhment from the parent plant.

Traſhing Canes.

CARE ſhould be taken in traſhing the canes at proper times, as the ſucceſs of the

the crop often depends on its being properly done. Canes on all ſoils ſhould be well traſhed when they begin to joint, to let the air get through to ſtrengthen them. On cold land, where the ſeaſons are heavy, they cannot be too often traſhed, provided you do it regularly; but if neglected for a few months, till the canes are four or five feet jointed, it is running a riſk to traſh them then, for the leaſt breeze will lodge them; but if they are regularly traſhed, they will grow better, and make much better returns.

The leaves of plants are of the utmoſt conſequence to the life of the whole kingdom of Nature: Air evidently paſſes in at the leaves, and is again diſcharged at the roots, after circulating throughout the organs of ſenſation; this is eaſily accounted for, from the abſorbing quality of the great quantity of dews, moiſt air, and rain; this they prove, becauſe many plants, if deſpoiled of their foliage, will occaſion their death. The leaves of plants act as lungs, the ſame as in the animal World.

On dry lands, and where they are ſubject to dry weather, canes ſhould not be traſhed after the month of November; the traſh makes them ſtand the dry weather better than they do otherwiſe. Canes that have been neglected till the north winds ſet in, are dangerous to traſh; the dry leaves act like ſo many braces, which if taken off, they fall with the firſt guſt;

par-

ticularly in theſe unfortunate Iſlands, which for theſe four laſt years have been liable to ſuch parched ſeaſons, that were the Planter to traſh in the windwardmoſt parts of them, he would intirely deſtroy any canes that may be ſaved, but in the ſeaſonable parts it will be of the utmoſt ſervice; for the dead leaves are a very great detriment to the plants, and traſhing them prevents their harbouring vermin, which they are very liable to do if the traſh continues on them, and one leaf affects another.

In dry weather, the Planter ought to be very careful in traſhing; for the foliage is of eſſential uſe to the plant; it helps to qualify and contemper the heat, and ſerves to hinder the too haſty evaporation of the moiſture about the roots, as well as to concoct and prepare the ſap for the nouriſhment of the plant.

> And call the clouds from high, to ruſh amain
> With pregnant ſtreams, to ſwell the teeming cane;
> But when the burning ſun too fiercely plays,
> The ſhrivell'd cane on a with'ring ſtem decays.

In the fertile Iſland of Antigua, there are a number of ſalt-petre ſpots of land, which are great eye-ſores, and prove very detrimental to the owners;—no remedy has yet been found for this evil. Ruminating one day, I recollected the great attraction quick-lime had, when uſed

ſed in extracting the ſalt-petre from its *matrix*. On the eſtate of John Bott, Eſquire, I made trial of it, and it anſwered very well; but it depends on the depth the ſalt-petre reaches: It took 4 pounds of a ſtrong double calcined alkali, to extract the ſalt from a ſquare foot of earth, but we did not attend to the depth of it. Should this prove a remedy, it will be of great utility in removing ſuch diſagreeable objects: I intend making a more accurate experiment at ſome future day.

Salt-petre ſoils are neither fit to plant or ſow,
Nor will be tam'd or mended by labour of the hoe.

Francis Martin, Eſq. on the Diamond Eſtate, in the above Iſland, informed me, that ſome years ago, ſeven acres and one fourth made forty-eight hogſheads of ſugar, of an exceeding good quality;—this is the greateſt yielding I ever knew. This little plantation is eſteemed among the firſt in Antigua. The eſtate of Langford Lovel, Eſquire, in the diviſion of Pope's-Head, in a good year, has made four hundred and twenty hogſheads of ſugar, and this year it has fallen ſhort near four hundred, merely from the baneful effects of dry weather, and the borer. Sir William Codrington's property has made near eight hundred hog-

ſheads leſs: But, ſpeaking generally, I am informed, the whole Iſland has fallen ſhort, near eighteen thouſand hogſheads, if not more. On the above properties every attention was given, and the works are amongſt the firſt in that Iſland, in every reſpect.

I was unfortunately too late in going to this Iſland, there were only a few eſtates at work; amongſt which were, two of Sir John Laforey's, under the care of John Harney, Eſq. the eſtate of Alexander Willock, Eſq. inſpected by Henry B. Lightfoot, Eſq. thoſe of Bertie Entwiſle, Eſq. Sir John Ogilvie, Bart. (managed by William Ogilvie, Eſq.) and Bandle's, under the charge of Langford Lovel, Eſq. On theſe eſtates, the managers paid the greateſt attention in favour of this criterion of tempering the raw cane juice in the reſervoirs, in which they ſucceeded to their utmoſt ſatisfaction.

Mr. Charles Collins, manager of the eſtate of John R. Fry, M. D. (an eſtate celebrated for making good ſugar) in Montſerrat, paid the ſtricteſt attention, which cauſed a ſurprizing difference in the quality of the ſugar.—The eſtates eminent for buildings in this Iſland, are thoſe of Thomas Mead, Samuel Martin Iriſh, and thoſe under the management of Richard Macnamara, Eſquires.

The eſtates of the Honourable John Richardſon Herbert, Eſquire, in Nevis, particularly

particularly his Clay-Gut eſtate, famous for both maſon and carpenter's work; indeed all his concerns are very compleat, as he ſpares no expence in finiſhing them; Walter Niſbet, Hon. George Webbe, 2dus, and Andrew Hamilton, Eſquires, have all very neat and convenient buildings.

The eſtate of John Eſtridge, Eſquire, in Saint Chriſtopher, has as magnificent a ſet of buildings as any I have ſeen in the Weſt-Indies; in fact, moſt of the plantation buildings in that exuberant Iſland are well finiſhed.

All the works in the delightful Iſland of Saint Croix, are neatly built, and indeed, this Iſland may be named the

Hortus in India Occidentalis.

The different ſoils that are to be met with in the Weſt-India Iſlands, may be reduced to three *generæ; viz.* ſand, loam or mother earth, and clay; gravels, and all the open ſoils, are of the ſandy race, and the binding earths, from loam down to the ſtiffneſs of chalk, may be ranged under the clay kind: Loam, or mother earth, is the medium between the two, and includes all the intermediate kinds.

In many places in Saint Croix, the *ſub-ſtrata* is marle, which is a calca-

reous earth blended with an argilaceous one:

Calcarea argella intime mexta.

It is probable that the good effects of marle in agriculture, proceeds from its containing an earth, ſoluble in water, and that it ſerves to haſten or facilitate the decompoſition of vegetable or animal ſubſtances, that may be mixed therewith, rendering their oily parts mucilagenous, and ſoluble in water, and thereby capable of penetrating into the pores of the roots of plants; it may alſo hinder the propagation of many obſtructions, beſides, I believe, it contributes much to vegetation, by furniſhing ærial acid, or fixed air, which it may afterwards reſume from the atmoſphere.—Theſe proportional manures muſt vary according to the local circumſtances of the ground; but marle ought to be uſed where clay is abſent. The indurated calcareous earth, or lime in maſſes or lumps, are very uſeful in aralable land, becauſe it moulders by degrees on the ſurface, and, attracting the water, retain longer than moſt other kinds of ſtones. The attraction of ſtones keeps the ſoil always moiſt; *for example* In the Iſland of Nevis, ſome parts are half covered over with thoſe attractors, by which

which means thoſe lands will ſtand the dry weather better, than if the ſtones were gathered together: This is the caſe in ſome parts of Saint Chriſtopher and Montſerrat alſo, particularly on the eſtate of Major Gage, in the latter.

In thoſe Iſlands, where the lands are cleared of woods, I would adviſe the Planters to plant the *Palma Nobles*, (Barbados cabbage-tree), and the *Cocoa Nucifera*, (cocoa-nut-tree), particularly in Saint Croix, which Iſland is entirely clear. Robert Thomſon, Eſq. in that Iſland, has taken the precaution to plant all the tops of the hills on his eſtate, with theſe trees, which will, in time, both attract and conduct the clouds.

In Montſerrat, ſome eſtates are much troubled with that inſect the *Cancer Ruricola*, or crab, which proves very deſtructive to the young canes; to remedy this, the Planters plant a piece of land adjoining, with the *Convolvulus*, or ſweet potatoe, which prevents this pernicious inſect from intirely deſolating the cane fields.—This wide genus of inſects belongs to the claſs *Aptera*.

Foſſil and Fixed Lixivial Salts of Plants for Temper.

IT is a detriment to the eſſential ſalt to uſe any alkali, if it could be helped; but

but from the natural accidents the tender plant is liable to, of late years in particular, it imbibes more acidity than the eſſential principles of the ſugar require, and by the ſuperabundance of acid, which is ſuch a preventative againſt the ſweet mucous ſubſtance chryſtallizing from its corroſive nature; for the cane naturally containeth no more acid, than is of eſſential ſervice to the ſugar; but, from the many ſtages it goes through from its infancy to ebullition, without ſome ſtrong alkali, the induſtrious Planter will labour under many errors. The cane is impregnated with a great quantity of aquæous matter, which is ſuch a diſſolvent, that, without a haſty evaporation of that component body, it hurts the quality of the ſugar; ſo that the larger the ſurfaces of the boilers, the quicker the evaporation, as it riſes only from their ſurfaces, and by ſeperating the heterogeneous bodies, and aſſembling the homogenous, or the ſweet mucous ſubſtance, by the aſſiſtance of fixed alkalines and ebullition, ſalts, either foſſil or vegetable, are neceſſary; but, in my opinion, the foſſils are the beſt.

When the calcareous earths are expoſed to the action of a violent fire, and are therefore converted into a cauſtic alkali, they undergo no other alteration in their compoſition, than the loſs of a ſmall quantity of water, and of their fixed air: It

It then becomes capable of corroding or diſſolving, which attraction had been inſenſible as long as the air adhered to the calcareous ſubſtance: The relation between fixed air and alkalines, is ſomewhat ſimilar to the relation between theſe and acids; that as the calcareous earth and alkali attract acids ſtrongly, and can be ſaturated with them, ſo they alſo attract fixed air, and are in their ordinary ſtate ſaturated with it, and, when we mix an acid with an alkali, or with an abſorbent earth, the air is then diſentangled from the alkali, by its great attraction towards acid, which has a greater affinity for air than water.

In the common proceſs, it will be hardly poſſible to prevent that enemy to the ſugar, fermentation, or any other method, from the accidents canes go thro', this aerial enemy, acidity, which is chiefly brought on by the former accidents and fermentation. But where there is a ſuperabundance of that corroſive matter acid, a *Sal Alkali* is requiſite; and where time cannot be ſpared to ſingle out the mortified canes, and on eſtates that are weak-handed, that the canes are often two or three days after they are cut before the juice is expreſſed, and the liquor remaining longer in the receiver than the Planter could wiſh; by theſe cauſes, an inteſtine war takes place, or a commotion of particles, by ſome active acid, which is ſuch an enemy to chryſtallization,

chryſtallization, the abſorption of the latter into the body of the alkali, is effected with a great velocity and friction; but ſhould this lixiviated ſalt be ſaturated with any proportion of aerial matter, the alkali, at the approach of the acid, expells the air, and abſorbs the particles of acid which come within its ſphere of attraction

All fixed alkalis are produced by art, being deprived of their natural aerial inhabitant by calcination, and becomes a ſtrong cauſtic alkali; great care ſhould be taken to keep it from being expoſed: If this precaution is not attended to, the fixed air, which floats in the atmoſphere, is abſorbed by the alkali, and reſtored to its calcareous native ſtate, to which the watery particles as gradually yield their place. All vegetables contain a deal of fixed ſalts, and but little volatile.

The word alkali was originally given, by the Arabians, to a ſalt extracted from the plant glaſs-wort, or *Kali*; but ſince it has been inveſtigated by that eminent Botaniſt Tournefort, is found to be a ſpecies of *Salſola*: Our modern chymiſts call any ſubſtance, which being mixed with acid, where an ebullition enſues thereon, alkali. A fixed alkaline ſalt may be conſidered no more than the earth of the plant, which, notwithſtanding the violence of the fire, has retained a little portion of its acid, ſufficient to diſſolve it in water: Theſe acids have

ſuch

ſuch an attractive force, that they cannot be ſeperated therefrom; they are ſo cloſely retained by the earth of the plant, as to be quite ſuppreſſed and loſt, as it were, in them; they attract water, but compoſe bodies which are not acid. The learned and ingenious Boerhaave ſays, that all dorſiferous plants yield a fixt alkali: I am of opinion, that the *Polypodium Arborium*, of the claſs *Cryptogamia*, and the order *Filices*, is the beſt, and will produce more than any ſpecies of plants in theſe Iſlands. This tree is to be found in all the woody gullies, about the ſize of the prickly palm tree; it is from fifteen to twenty feet high, and the body about two feet in circumference, and of a hard conexture.

Coudex ſimplex a ice frondoſus.

The fern grows about ten feet broad at the top. When the Planter wants this for temper, cut it when in fructification, which may be ſeen on the back of the leaves in round ſpots like duſt. There are two ſpecies of this tree, one with long prickles on the body.

Coudex ſpinoſum.

May exuberant moiſture abound, and ſeaſonable rains
Propitiouſly deſcend to refreſh the canes.

Boiling

IS the art of decompounding the different bodies, and neutralizing the mucous body, the eſſential ſalt, by evaporation, and a commotion ariſing from the mixture of the alkali with the acid. The proceſs of boiling and diſtilling, is the real anatomy of the cane. The expreſſing the juice, and boiling and reducing it into ſugar, the Spaniards and Portugueſe firſt learnt from the Orientals: the ancient authors denominated it *Sal Indica*. The plant *habitat India Orientalis*, and likewiſe Africa, and only here exotic.

The introduction of new plants into any country, is productive of a very beneficial trade; that valuable plant the ſugar cane affording ſuch a rich commerce to all Europe and America. Some authors are of opinion, that this plant was brought from the Continent to Cyprus, and from thence into Sicily, where ſugar was made *anno domini* 1148: Others inſiſt it was brought from India by the Saracens, and from Sicily it was tranſplanted to Madeira, by the Portugueſe, about the year 1420, and from thence, or the ſouthern coaſt of Africa, to Brazil; but the Portugueſe, being in poſſeſſion of the coaſt of Angola, firſt tranſplanted the ſugar cane from thence to Brazil in 1506. The ſugar canes were introduced

troduced from Brazil into the Iſland of St. Domingo, where many ſugar-mills were erected in 1640; they were afterwards tranſplanted from Brazil to Barbados, and from thence to all the Weſt-India Colonies. Sugar was, by Serapion, called *Spondium*, by the Perſians, *Tabaxir*, and by the Indians, *Mambu*:—Salmaſius aſſures us, that the Arabs uſed the art of making ſugar about 900 years ago.

Paulus Ægineta, one of the Greek Hiſtorians on that ſubject, *anno* 1625, is the firſt who mentions ſugar; it was firſt called *Mel Arundinaceum*: He adds, that it came originally from China, by way of *India Orientalis*, and Arabia; it is yet doubtful, whether the ſugar cane was originally indigenous of Africa or Aſia; but it is become a general opinion, it is from China, for in that fine tract of land to the eaſtward of the kingdom of Cambodia, named Cochin China, they make upwards of 40,000 hogſheads *per annum*; and refined ſugar, of the beſt quality, is ſold at the port of Taiſo, in exchange for other merchandize, at the rate of fourteen ſhillings the Cochin China quintal, which weighs from one hundred and fifty to two hundred, French, and ninety-one pounds, eight ounces, French, make one hundred pounds, Engliſh, which is purchaſing this valuable article at a cheap rate. The alkalines they uſed to abſorb the ſuperfluous a-

cid, were the aſhes of the *Muſa*, and ſhell lime: It appears, they had a knowledge that the exceſs of acid prevented a chryſtallization.

That celebrated Chymiſt Margraff, extracted an eſſential ſalt, from moſt vegetables, the *Petales* of moſt flowers, and the *Nectarium* placed in the organs; but it appears that the *Saccharium* contains it in a larger proportion than any other plant.

Acer Saccharinum,

or maple-tree of America, produces a ſweet maſs, without any form of a chryſtallization:——This manufactory will never hurt our Sugar Colonies. Some of our able Chymiſts ſuppoſe the different operations ſeperate a fat matter from the juice of the cane, and render it inſceptible of chryſtallization: The great Chymiſt, Bergman's, opinion was, that the lime deprived it of that exceſs of acid, which prevents it from ſhooting into chryſtals.

Of all the methods that have been propoſed and tried to clarify the cane-juice, Mr. St. Hill's precipitating boilers, with pipes and ſyphons, have proved to be the ſimpleſt and moſt profitable to the Planter, and have given general ſatisfaction where they have been properly

ly

ly ſet: Where they have failed, it has been owing to the people being unacquainted with the principles of the plan, the ſize of the pipes required, and the manner of fixing them.

Sugar, that is made from liquor clarified by St. Hill's precipitaters, will be found from five to ten *per cent.* better than that made from the common proceſs, for the following reaſons: All cane-juice is impregnated with a proportion of gum-reſinous, more or leſs, (according to the quality of the canes, and the ſoil they grew on) of a dark colour, that makes the ſugar clammy, and prevents the melaſſes from ſeperating freely, and cannot be extracted but by precipitation, or ſtraining through very thick blankets, which are troubleſome, and ſeldom properly attended to, where negroes are often left to themſelves; and, where it is properly done, requires at leaſt a dozen blankets, which is conſtant employment for a negro to waſh and dry, as a blanket will only ſtrain one boiler of liquor, to do juſtice. The gum does not ſeperate until the liquor begins to ſimmer or boil ſlowly, and being a heavier body than the liquor at that time, falls to the bottom of the precipitaters, when the fire is damped; but the common proceſs intermingles it with the liquor, being agitated by the conſtant fire. The ſyphon being fixed a little above the bottom, draws off the liquor clear to the intermediate

intermediate boilers, which, if properly done, requires no further cleaning. Secondly, the advantages of conveying the juice immediately to the precipitater, ſo that the liquor has no time to ferment, only the misfortunes of nature the plant is liable to in the field, which I have already given an account of. By this the leſs temper may be given, and what may be uſed in my opinion, the foſſil ſalt is the beſt. When the liquor is very rich and glutinous, it ſometimes happens, that the gum-reſinous will not precipitate without the liquor being diluted with a little ſaline water, or clear water will ſometimes anſwer as well. To try the experiment, put a little of the liquor in two tumblers; add ſaline water to the one, and clear water to the other; you will then ſee whether the liquor wants temper, or only to be diluted ſo as to make it ſeparate freely. If one pint of cane-juice takes two grains and a half of either vegetable or foſſil alkali, to abſorb the redundant acid, what quantity of alkali will abſorb the acid in three hundred gallons of the ſame liquor?

Mr. Beuly fully demonſtrated that this aerial ſubſtance is a peculiar and diſtinct acid fluid, *Sui Generis*. Aerial acid, or fixed air, being about one half heavier than common air, it is very difficult to diſengage it totally from water boiling.

The

The juice of plants, when ſeperated from the aqueous vehicle, is arranged into three *generæ*, mucilaginous, ſaponaceous, and gum-reſinous ſubſtances.

EXAMPLE:

300 gallons
8 pints in a gallon

2400
2 grains

4800
¼ 1200

Grains in 1 lb. 576,0) 600,0(1 lb. 1 pwt. *Anſwer.*
576

24 grains equal to 1 pwt.

By this the ingenious Planter may be a judge of the regular quantity of temper the liquor will take: take a quart glaſs decanter, put in a pint of cane juice from the receiver, then weigh off ſo many grains, and mix in the decanter, you will ſee a ſeparation take place, by the attraction of the alkali towards the acid, which forces the aerial matter out of its former habitation, which the alkali was deprived of by calcination; by the ſpecific gravity the alkali will precipitate, and the ſolution be left free from its ſuperfluous acidity.

I ſhall give a few hints how the lime acts in the abſorption of the acid, expelling the aerial acid or fixed air:

Calcareous ſtones, before they paſs the fire,

fire, contain aerial and aqueous bodies; quick lime contains neither, being expelled by calcination: The conſequence of this difference of principle is very remarkable in their properties—calcareous earths are perfectly mild, inſoluble in water, and will effervesce with acids—*lime is caustic, ſoluble in water, and produces no effervesence, with acids; that this difference cannot be aſcribed to water, is very certain, the preſence or abſence of aerial acids, therefore, muſt be the ſole cauſe; for it will ſaturate the ſame quantity of acid as its pores can abſorb, and expel all air; the ſaturation will be performed without effervesence—there can be no effervesence in abſence of that aerial matter, but if the lime is expoſed for a few hours, it imbibes a quantity of air, and makes a ſlight effervesence with acids; after being expoſed ſome time, it becomes intirely mild and effervesced: As this conjunction of the acid with the alkali, happens without the leaſt effervesence, our principles lay us under a neceſſity of allowing that alkali to be perfectly free of air, which muſt proceed from its being ſaturated, and incapable of union with fixed air.

Boilers hung after this manner require fewer negroes to manage them, than thoſe ſet in the common way; and

* The quantity of aerial diſſolvent expelled from lime ſtone, by fire, is about one third of its weight.

the

the proceſs is ſo ſimple, that there is little riſque of their going wrong when they are once properly put in the way, as it is their intereſt to be careful in drawing the liquor off clear, to ſave themſelves the trouble of ſcumming after.

Another advantage ariſing from this plan is, the boilers never gather ſcales, which burn them, and injure the colour of the ſugar: It is the gum-reſinous of the canes which incruſtates on the ſides of the boilers, and the ſyrup adhering to them, forms thoſe hard ſcales that are ſo prejudicial. If the liquor is properly precipitated, the boilers will be free from them, and eaſily kept clean; which muſt make them wear double the time they do in common. The gentlemen that firſt tried this plan, imagined they would fall ſhort in their rum-crops; but in this they found themſelves agreeably deceived: Although there is little or no ſcum goes to the ſtill-houſe, the proportion of rum will be within ten *per cent.* of their uſual crops; which is as much as they then made, when it is conſidered that the ſcummings ſaved will make an addition of ten *per cent.* to the ſugar-crop in quantity, beſides the difference in quality, as will appear by the following calculation:

An eſtate that makes at the rate of ten hogſheads of ſugar weekly, will ſend to the ſtill-houſe, on an average, 2600 gal-

lons of ſcum; 800 of that we will allow for filth and traſh, which is about the proportion taken off by St. Hill's plan; there remains 1800 gallons of clear liquor, that will, on an average throughout Jamaica, make a hogſhead of ſugar; but 1400 gallons, on an average, are ſufficient to make a hogſhead throughout theſe Iſlands: The ſmalleſt proportion I ever ſaw taken for that purpoſe, was 700 gallons. It is well known, that part of the ſcum is taken off, when the liquor is half-boiled; when the juice is rich, and there is leſs ſcum, the ſame proportion will hold good. The reaſon why the rum-crop will be nearly in proportion to what they make in the common way is, the gum being extracted by the precipitaters, the ſugar chryſtallizes much better, and ſeperates ſo freely with the melaſſes, that the hogſheads will give from ten to fifteen gallons more than they do in the common way, which is equivalent to the ſcummings for the ſtill-houſe: The ſugar, being ſhipped well-cured and dry, loſes little on the paſſage; whereas a great deal of the ſugar made by the common proceſs is clammy, and does not part with all the melaſſes till ſhipped, when the ſea air, and the motion of the veſſel, make it give and run into the hold, what ſhould have been diſcharged in the curing-houſe, and often carries part of the ſugar with it; the caſks then give way, and arrive in bad order,

order, which expoſes them to pilferage and waſte, and, when landed, many of the caſks fall ſhort of their original weight from 300 to 400 pounds, which is a great loſs to the ſhipper, either Planter or Merchant, and, another object is, the ſugar is of an inferior quality. The loſs of freight is felt conſiderably by the owners;—a ſhip that carries 500 hogſheads, falls ſhort at leaſt 40, for the melaſſes that drains from the ſugar in the veſſel, is pump'd out in the paſſage along with the bilge water. In the Port of St. John, in the Iſland of Antigua, I was told by an old trader, and a very reſpectable captain, that on board of his ſhip he might ſwim a boat in the hold with melaſſes; ſeveral families, poſſeſſed of very ample fortunes, who took paſſage in the ſame veſſel, aſſured me they would make their remarks on that ſubject.—— This is not ſo conſiderable a loſs to the Planter, who diſpoſes of his ſugar in the Iſland where it was made, but the Merchant is the greateſt ſufferer; the Planter falls ſhort in the difference of quality only. Another grand object is, that it is a great loſs to this part of the World in general, for what is loſt to the Planter or Merchant, the whole community, in ſome meaſure, partakes, particularly in theſe late years, when the Leeward Iſlands have ſuffered ſo much. The expence to prevent this baneful defect, is ſo trifling, that 'tis hardly worth men-

tioning; attention of the Planter is the only hardſhip attending it, and where this attention has been paid, they have ſucceeded—this moſt Planters in theſe Iſlands have found frequently, to their coſt.

In ſome parts of theſe Iſlands, the Planters are troubled with the black and yellow blaſt; the latter deſtroys the cane intirely, the former impoveriſhes the juices to a great degree, and what ſugar they make is in general very bad. When the Planter has the misfortune to be troubled with theſe inſects, the precipitaters are of the utmoſt utility: Thoſe animalcules take care to depoſit their eggs, or ſeeds, in ſuch places, where they may have ſufficient incubation, as we are certain all inſects are *ex ovo*. Theſe ſmall inſects are only indigenous to the ſugar-cane; they affect them about the joints, and ſometimes the whole plant periſhes: Thoſe *niduli* of black glutinous filth, come off in the grinding, incorporate ſo firmly with the liquor, that they cannot be extracted but by precipitating, which, if properly done, the ſugar may be made very marketable.

Five years ago, I had the opportunity of ſeeing the utility of St. Hill's precipitaters proved, by ſugar made (from canes that had the black blaſt,) by them, and *that* made by the common proceſs, on two eſtates that were only divided by an interval of twenty-four feet, the ſoil the ſame,

ſame, the canes, to all appearance, in the ſame ſtate, planted and cut at the ſame time, and which, before that year, made ſugar of an equal quality. The eſtate that uſed the precipitating boilers, made good ſtraw-coloured ſugar, with a ſtrong grain, that ſold at the average price of ſugar ſhipped that year: The eſtate that uſed the common boilers, made as bad ſugar as ever was ſhipped; what it ſold for I never heard, but this I know, a ſugar-refiner, eminent in his profeſſion, tried ſome of it, and, after re-boiling and claying, could not make ſugar equal to good muſcovado. The gentlemen concerned for thoſe properties, and others, gave it as their opinion, that the glutinous filth of the black blaſt, being extracted by the precipitaters, made the difference.

Some have tried St. Hill's plan with two precipitaters, which have anſwered pretty well; but three are much better: There is then no occaſion for a reſervoir, there being always one of the precipitaters ready to receive the liquor from the mill; and it is my opinion, the ſooner the juice goes on the fire after it comes from the canes, the better, as it gets into a fermentation by the acidity that is natural to the plant, and the attraction of that acid towards the ſaccharine particles, which, being a ſharp-pointed corpuſcle, ruſhes with ſuch velocity and friction, that it moves the menſtruum, and excites

cites heat, by ſhaking aſunder thoſe minute bodies, and turns them into air, and generates bubbles. This is the caſe with all cane liquor, that remains any time after being expreſſed from the cane; by that, the juice gets impregnated with more acid than is requiſite, and muſt be ſeperated by the aſſiſtance of an alkali: It was the opinion of that luminary of natural hiſtory, Sir Iſaac Newton, that all diſſolutions in fermentation, are effected by the attraction of acid. The ſame fuel that ſerves in the common method, will do in this plan of oblong boilers; and the ſeperation of the volatile bodies, is performed with ſo much lightneſs and celerity, that the eſſential ſalt arrives at maturity ſooner: we are certain, the ſhorter it remains on the fire, the better. The tache ought to contain no more than fifty gallons, for the leſs it contains, the ſugar chryſtallizes the ſooner, being ſeperated from its diſſolvent the quicker; for in the interim of the volatile particles and the chryſtallization, the ſweet bodies are in a gummous ſtate, and very apt to adhere to the ſides of the tache, which injure the boiler, and prove pernicious to the ſugar. The more ſpacious and airy the boiling-houſe, the better; for this reaſon, the tranſmuted fleecy vapours will be diſſipated with more celerity, and the evaporation of the volatile particles from the ſurfaces of the boilers be quicker; if otherwiſe,

the

the denſity of the rarified bodies ſuſpended over the boilers, will retard the proceſs. The other boilers ought to be flat, the ſame at the bottom, the ſame at the brim, for the following reaſons:

1ſt. There is one thing to be obſerved, that the ſame quantity is evaporated ſo much eaſier in proportion as the ſurface is enlarged; for the more this is diffuſed, the more particles of fire it receives, and with the ſpecific levity of the liquor and external impulſe, forces the evaporation the ſwifter.

2d. For by the ſame degree of fire, volatile bodies will not equally ariſe, though they are of the ſame ſpecific gravity, if there be that difference in their ſurfaces; for the aſcent of fluid ſubſtances, is effected two ways, their ſpecific gravity and impulſe; theſe aſcend and act with more celerity, according to the extent of the ſurfaces; and the air being the ſecond agent in evaporation, acts with more force than in a round bottom.

If the precipitaters be entirely flat at the bottom, they ſhould be 20 inches from the fire, the bottom reſting on 6 inches of wall, and built cloſe to the bottom, allowing 8 inches for a flue, beginning at the ſide next the boiling-houſe, riſing regularly from the bottom, where the aperture originated; and goes from thence round on each ſide, riſing about half way up the ſide, and till the entrance of the flue of the chimnies,

where

where the effluvia is diſſipated; the bottom of the boiler ought to be on a level with the ſurface of the intermediate boiler: One of theſe boilers was hung by Mr. Charles M'Tier, on the Needs-Muſt eſtate of William Woodley, Eſq. in St. Chriſtopher's, which boiled very quick.

The addition of one receiver in the boiling-houſe more than in common, is all the expence the Planter may be at, and as ſoon as one receiver is full, the juice muſt be conveyed into another, ſo that the liquor may have ſufficient time, after the ſaturation, to precipitate by its ſpecific gravity, and according to ſome ingenious Chymiſts, the lime, if properly prevented from being ſaturated, will cut that viſcous matter, and abſorb the redundant acid, which I have experienced in my peregrination: But ſhould the alkali be expoſed, and get ſaturated with what the fire diſunites, when mixed with the juice, the fixed air will immediately be expelled, and will produce an effervеſcence; but ſhould this union betwixt alkali and fixed air be prevented by care, and mixed with the cane juice, no effervеſcence will happen—the acid will join the alkali in place of the air; but when effervеſcence is occaſioned by the air leaving its habitation for the acid, it is very prejudicial to the juice, as it is very difficult to be diſengaged from the liquor.

Let the ſpigot of the receiver be made according

according to the depth of it, the ſhallower it is, the better—the heterogenous body will precipitate the ſooner. Suppoſe the receiver be two feet, and the precipitation twenty minutes, have two ſpiles, and it will only require ten minutes to precipitate half way; by that means the liquor may be drawn off at half way, which expedites the proceſs, and before that part of the liquor runs off, the lower ſpile, placed one inch from the bottom, it will be ready to draw off: The precipitation will be perfectly finiſhed, and the liquor alſo clean from all that viſcous matter, and exceſs of acid; all this was formerly incorporated in ebullition, by means of which, the liquor took a great deal more boiling: The redundant acid cannot be diſengaged ſo quick, being ſpecifically a heavier body than water, for which reaſon the chryſtallization ſeldom could be obtained ſo well as by this criterion. The Planter hath nothing to do but to have a quick fire, to ſeperate the aqueous body from the mucous, which will then ſhoot into chryſtals; but, according to the old habit, this heterogeneous will be incorporated with the ſaccharine particles.

Size of the Precipitaters.

When there are three precipitaing

boilers, they ought to contain three hundred gallons each; the boiler they are drawn into ought to contain two hundred and fifty gallons, that the liquor may be drawn off at once, which quickens the proceſs, and gives time to clean the precipitaters each time they are drawn off: where the precipitaters are two large in proportion to the intermediate boilers, the liquor muſt be drawn off at different times, which lets it cool and expends more fuel than neceſſary.

Of Dampers for the Chimnies.

It is not only neceſſary to have dampers in the chimnies of the precipitating boilers, but in the chimnies of the taches and intermediate boilers, which ought to be ſhut when they ſtrike a ſkip, and when they are turning over the liquor from the clarifier, when they boil in the common way. What is commonly called damping the fire when they are taking off a ſkip, is opening a gate at the end of the grating, and the air getting in, drives the fire out of the chimney; and it is ſome time after it is ſhut, before the fire comes to the heighth it was at before the grate was open. There are ten or fifteen minutes loſt, and the fuel expended in that time, which is conſiderable in the courſe of the crop; when the

the damper in the chimney is ſhut, it ſuffocates the fire, and when drawn, the fire burns with violence, there is no fuel loſt, and ſaves the boilers.

A damper for the chimney is a plate of iron, the ſize of the flue, which ſlides in a frame with a handle, that may be either on the ſide of the fire-maker, or into the boiling-houſe, that the boiler may ſhut when he has occaſion; the damper ſhould be fixed a little above the vent, which is commonly left to cool the boilers.

Of Lime for Temper.

THE beſt lime for temper, is burnt out of flint ſtones, of which they have plenty in ſome parts of theſe Iſlands; and the hard mountain ſtones, that appear like chryſtals when broke, if burnt in a ſtanding kiln, and put into a caſk before ſlacked till uſed, is preferable to Briſtol lime; but the common lime made uſe of is very indifferent, and being impregnated with the ſalts of the wood it is burnt with, which makes the ſugar give in damp weather, eſpecially at ſea; but it is ſometimes neceſſary where the canes are a little tainted, the alkali of the lime is not ſufficient to correct the acid and neutralize it.

The ſmaller the ſtones are broke, the

better, for this reaſon; the cavities of them are ſo impregnated with air and water, they get too much expanded by the heat, ſo that it makes them fly with violence, and endangers ſome part of the kiln falling down, before half the ſtones are calcined.

My reaſon for adviſing the Planter to uſe the unſlacked for temper is, in this ſtate it is reduced into a fine friable impalpable calx, by being deprived of its humidity and air by calcination, but when ſlacked, the pores are left void of the igneous particles that enter them, ſo that the unſlacked lime is the ſtrongeſt abſorbent: In all calx, there is a hard ſubſtance, which is inſoluble and precipitate, which burns the boiler, and hurts the quality of the ſugar; but this may be prevented, by tempering in the receiver.

Claying Sugar.

CLAYING of ſugar has been very little attended to in theſe Iſlands, although every manager clays a little for plantation uſe. Sugar made from liquor clarified by St. Hill's precipitaters, properly tempered, boiled, and clayed, may on many eſtates, be nearly, and often is, as good as ſingle-refined ſugar, and would anſwer the purpoſe of the refiners in Britain,

Britain, as well as to make double-refined ſugar; the additional price will amply repay for the reduction, and the ſugar pay the charges of pots and negro labour. Claying will anſwer very well on plantations that are diſtant from market, as it would ſave one-fourth carriage, and the ſugar being ſhipped in tight tierces, loſes nothing on the paſſage, and neat as much *per* tierce, as muſcovado *per* hhd. By tempering higher, you deprive this eſſential ſalt of a greater portion of its acid than in the common method; for acid attracts water more than any other body, and where a combination takes place, is too ſtrong a menſtruum for the ſaccharine particles, and a ſtrong diſſolution enſues, by which means the grain ſuffers.

The above method muſt be carefully done; for if ſugar is deprived of too much of its acidity, in a ſolution of the ſame ſugar will remain a ſediment of inſipid terreſtrial particles at the bottom, indiſſolvible in water, but if any acid or ſpirit is added, it diſſolves entirely. This is a ſure ſign of the eſſential ſalt being deprived too much of the acid principle, for the water from the clay filtering gently, corrects only the groſſeſt particles, acting as a ſimple diſſolvent of itſelf; but in warm rainy weather, when the atmoſphere is in commotion, it contains infinite kinds of extraneous bodies, but in particular ſaline particles, and affords a ſtrong menſtruum. *Potting.*

Potting.

SOME uſe wooden pots, but earthen are much better and cleaner. Waſh the pots clean, dry them, and fix a piece of cane top, or the ſtem of a plantain-leaf, about half way up the pot, with a little clay in the bottom, and pot the ſugar when it is properly granulated, and before it begins to turn firm, as when it is potted in hhds. The time to put on the clay depends upon the ſtrength of the ſugar, but, in general, it may be put on when it is twenty-four hours potted: The clay being put on when the ſugar is green, has a much better effect than when it is dry; the water from the clay keeps up the ſeperation, bleaches the ſugar without diſſolving the grain, and corrects nothing but the groſſer particles and melaſſes, and cures the ſugar to the bottom of the pot. When the ſugar is dry before clayed, the water from the clay diſſolves the grain, and does not make it near ſo white, and reduces more than when the clay is put on the firſt or ſecond day after it is potted.

One obſervation I muſt make, which I have ſeen anſwer exceeding well—that is, to have a plug in the center of the cooler, letting the cooler incline ſloping towards the centre; the veſſel to be ſhallow, not above 8 inches deep—the formation will be finiſhed the ſooner, and will

will chryſtallize in hexahedral truncated bodies: The ſugar, when in the cooler, muſt be moved twice, with a ſtick not above 3 inches broad at one end; for if it is turned with the ladle, it is apt to hurt the chryſtallization, which is the time of the formation. When you are going to pot, cut through the middle, and take out the plugs, then begin at each end; the melaſſes will ſlide from the ſmooth ſide of the chryſtals, and will ſeperate much, and will make a difference of 8 days in curing.

To prepare the Sugar for Claying.

Dig the ſurface of the pot about ſix inches, and examine if there is a falſe bottom, which muſt be taken out, and any hard lumps of pan-ſugar that may be amongſt it; then ſmooth the ſurface of the pot, making it a little hollow in the middle, which makes the clay keep in a body, as it dries and keeps the ſurface even.

How to mix the Clay.

Take a boiler of any ſize that may be convenient but large if it can be had; fill

fill it about two-thirds full of clay, and put on thirty or forty gallons of water; take a large handſpike, and fix a parcel of iron pikes round the lower end, and a croſs piece of wood at the upper end, for a handle; lay the handſpike on the edges of the boiler, and work the pikes on the ſurface of the clay, which will in a ſhort time mix the water and the clay to a proper conſiſtence: ſcum that off, and add more water, and work as before. By this method, a negro will mix as much batter in one day as will clay three hundred pots: if the clay is well worked, a pot that contains eighty weight of ſugar, will take a gallon of clay-batter. It is ſafer to put on the batter very thick, as it is apt to run when thin, and make holes in the ſugar. Let the batter remain on the ſugar until it is dry, that it may be lifted off whole; then ſweep the ſurface, and ſmooth it as before; let it ſtand twenty-four hours, and then put on the ſecond batter, about two thirds as much as the firſt time; when dry, take off and ſweep the ſurface while damp, as it cannot be done ſo well afterwards; then draw the cane-top out of the bottom, to let out any ſyrup that may have vent.

Sugar that is properly attended to during the claying, will be fit to ſhip ſix weeks after it is made, and ought to be ſhipped in the following order: Start the ſugar on a clean barbicue or cloth, and

and divide it into three different parcels, which ought to be put in three different caſks, and marked: The firſt will be nearly equal to ſingle-refined, the ſecond as good as French clayed ſugar, and the third good Muſcovado. By ſorting the ſugar properly in packing, it will ſell much better than it would, if tops and bottoms were mixed.

It is of little conſequence what colour the clay is, if it is free from minerals; To try that, mix ſome of the clay you intend to uſe with water, and let it ſettle; if it tinges the water, it will communicate the ſame colour to the ſugar.

Blankets.

SOME have tried four or five folds of blankets, but they do not anſwer ſo well as clay. The water paſſes too ſoon through them, diſſolves the ſugar, and reduces the quantity more than clay.

In good ſugar, the reduction by clay will be about twenty-five *per cent.* and indifferent thirty; ſometimes it is not above twenty.

Diſtillation,

IN chymiſtry, the art of ſeperating the ſpirituous, aqueous, oleaginous bodies

from the groſſer and terreſtrial parts by fire, and condenſing them by cold, the more regular the fire is kept, when it riſes at a proper degree, which is when the liquor in the clambic boils. The boiling is by chymiſts called the third degree, and ſeperates all volatile particles by evaporation, the motion being effected by heat and air; for fire renders the former bodies ſpecifically lighter than before, ſo as to aſcend according to the laws of equilibrium. The degrees of heat cannot be raiſed to a higher pitch; the heavier the fuel, the fire will burn more vehemently: It is not only ſpecific gravity that elevates bodies in diſtillation, but the impulſe of the fire, although the particles are very ſmall and light, yet it will raiſe bodies ſpecifically heavier than itſelf, it acts with ſo much force; ſpecific levity, and extent of ſurface, being a great matter in diſtillation. Diſtillation is very eaſily acquired, by paying proper attention to quality and quantity of ſweets, and different ingredients neceſſary to bring on a fermentation; the time the liquor ought to be taken; and care requiſite in diſtilling the low wines into rum; the ſituation of the diſtillery; the fixing of the ſtills and fermenting ciſterns properly. There is no part of the plantation buſineſs has been ſo little attended to, as the ſtill-houſe, the management of it being often left to ignorant people, that go under the denomination

mination of ſtillers; thoſe people being employed, prevent the overſeers from learning that part of the buſineſs, whereby, when they become managers, they are not able to ſee when the diſtillery is going on properly, by which many Planters ſuffer. Some Planters have of late given proper encouragement to men of knowledge in that profeſſion, and made conſiderable improvements in diſtillation; but few eſtates have a ſufficiency of utenſils to carry on the proceſs with that cleanneſs and expedition that is neceſſary; although the expence in having them in proper order is very inconſiderable, in proportion to the additional quantity of ſpirit they might make, and of a better quality.

The ſtill-houſe ought to be ſo proportioned to the boiling-houſe, that the melaſſes might be fermented as ſoon as it drains from the ſugar; for it loſes conſiderably in being allowed to ferment in the ciſtern in the curing-houſe. The ciſtern ought to be cleaned out once a-week, and the melaſſes put into a ſpare ciſtern, or to have two to let the melaſſes run into alternately.

Fermentation,

Is an inteſtine ſpontaneous motion, ariſing from the attractive force of acids,

which rarifies and ſubtilizes the ſweet mucous body; it acts as a menſtruum for all ſweet particles; it is a ſharp-pointed particle, and acts with great velocity and friction in diſſolving the ſaccharine body. It excites heat, and turns them into air, which may be ſeen on the ſurfaces of the ciſterns in form of bubbles; the acidity of the liquor floats about, and being a ſolid pointed particle, is kept in motion, by the repeated impulſe of the matter, light; a moderate warmth much haſtens this proceſs; it aſſiſts in opening the vicidities, in which ſome of the ſpirituous parts may be entangled, and unbends the ſpring of the aerial matter; for the fixed air that is incloſed in the interſtices of the ſaccharine particles thus expanded, and moving upwards, will meet and coaleſce in their paſſage; by which means ſmall corpuſcules of the liquor will be heaved up and let fall again, alternately as the air diſengages itſelf. This is often to be ſeen in fermenting houſes, on the ſurfaces of the ciſterns, and occaſions a deal of bubbles, which are produced by the elaſticity of the fixed air, diſentangling itſelf from the menſtruum, as the ſweet particles are diſſolved by the force of that corroſive ſubſtance acid. By the ſeparating this aerial matter, a deal of the ſubtile ſpirit is evaporated, by its ſpecific levity and force of the air; for the heat in the ciſtern ought never to exceed that of the human body. Fer-

Fermentation, taking it altogether, would be nothing elſe than putrefaction, to which both the animal and vegetable kingdoms naturally and continually tend during their life ſlowly and inſenſibly; but, after their death, quickly and ſenſibly.

There are three particular kinds of fermentation, or three degrees of the ſame fermentation, which refer to the three principal products which reſult from it.

The firſt is called vinous, or ſpirituous fermentation; becauſe it changes into wine the liquors which undergo it; and from this wine may be obtained an inflammable ſpirit miſcible with water. All ſubſtances ſuſceptible of the ſpirituous, afterwards undergo the acetous, which is the ſecond ſtage of fermentation, becauſe the product of it is acid or vinegar.

The third fermentation is called the putrefactive; it might alſo be denominated the alkaline fermentation, from the great quantity of volatile alkali that is diſengaged; but we cannot form an adequate notion of it, without conſidering attentively the particular phenomena which appear in the different degrees of fermentation.

Ciſterns are much better than vats, as they are not ſo eaſily affected at the change of weather, and, if properly ſet, not ſo liable to leak, and keep a more regular fermentation. The

The number of ciſterns required depends on the quantity of rum you expect to make weekly, and the ſituation of the ſtill-houſe; if it is ſituated on a dry hill, particularly marl, they will work off in half the time they will do, if it is placed on a cold bottom. To obviate that, raiſe the bottom of the ciſterns above the level of the ground, which will keep the ſpaces dry, and not be ſo eaſily affected with damp weather.

If the liquor is properly ſet, it will in general work off in a week; 1000 gallons of fermented liquor will, on an average, make a puncheon of proof-rum of 115 gallons: Sometimes, 1000 gallons of liquor will make the ſame quantity, when fermented in warm weather, and the melaſſes very rich.

Twenty-four fermenting vats, each to contain 400 gallons at 14 *per cent.* are ſufficient to make from ſix to eight puncheons of rum *per* week; and in the ſame proportion for any quantity.

Some years ago, a method was introduced, in Jamaica, of fermenting with a large ciſtern, that contained as much as ſix or eight common ciſterns; that being filled, and ſet a fermenting, they filled the ſmall ciſterns out of it, one or two in a day, as they were diſtilled, and filled up the general fermenter with melaſſes, dunder, &c. in proportion to the quantity taken out; the fermentation being continued expedites the proceſs, and it may be

be carried on with fewer utenſils. A large fermenter, to contain 5000 gallons, with ſix of 1000 gallons, is equal to ſixteen of the ſame ſize, to ferment in the common way.

Liquor fermented by the above method, yields more *per cent.* than the other way, for this reaſon—the fermentation being continued, warms the adjacent ſpace, which keeps a regular heat in the liquor, and by working it with the beaters, diſſolves the ſweets, and any candied melaſſes that are frequently made uſe of.

Utenſils to make from ſeven to ten Puncheons weekly.

		Galls.
1	Large fermenting ciſtern, to contain -	5000
6	Ditto ditto, ditto each -	1000
1	Ciſtern to receive the ſcum, - -	1000
1	Ditto to ditto the dunder, - -	800
2	Dunder coolers, each - - -	600
1	Scumming ditto, - - -	600
1	Low-wine ſtill, to contain - -	1000
1	Still for rum, ditto - - -	650
2	Batts for low-wines, ditto each, - -	500
A tank large enough to contain both worms,		
A copper pump for the dunder, with brass valves, and the ſucker covered with ſail-duck.		
A copper pump, to pump the liquor into the ſtills, gutters, buckets, pails, &c.		

Note.—*The above is the proportion uſed in Jamaica.*

In the beginning of the crop, very few diſtillers take the neceſſary means of putting the ciſterns or vats in order to bring

bring on a proper fermentation, and loſe at leaſt one-third of the returns they ought to get the firſt, and often the ſecond ſetting; which may be eaſily ſeen by the diſtiller's day book: You will find the returns the firſt ſetting, not within thirty *per cent.* of what they will be the third and fourth, greateſt part of which might be ſaved by uſing the proper methods at the beginning.

What is proper to be done at the beginning of Crop.

CLEAN out the ciſterns, waſh and burn a little dry traſh in them, to expel any damp putrid air that may be in them, then fill them with traſh from the mill, which will ferment in a few days; heat the adjacent ſpace, and give the ciſterns a proper heat for fermentation; let the traſh remain in them at leaſt four days, then take it out, as you find occaſion to uſe them; put in the liquor to ferment immediately after the traſh is taken out; you will find the fermentation begin in a few hours, work off as ſoon, and yield as well as any time in the crop, with the ſame proportion of ſweets.

The reaſon for uſing traſh in the ciſterns at the beginning of crop is, the ſharp particles of acid imbibed into the ciſtern;

ciſtern; no ſooner the liquor is put in to ferment than the acid disjoins, and ſhakes the ſaccharine bodies one from another; and diſſolves the whole—it is the only diſſolvent in fermentation. Let the traſh you uſe be taken from the mill-houſe; for if you uſe old traſh, it is deprived of the volatile acid, that is moſtly exhaled, and will not act with ſo much force, having loſt a great part of its acid by the exhalation, although the particles of acid are groſſer than the aqueous, for which reaſon, the water evaporates the quicker.

How to uſe Scummings.

The ſcummings ought to ferment before uſed, which makes them throw up the traſh and filth, and may be drawn off clear; a few pails of dunder thrown into the ſcummings will aſſiſt the fermentation, and make them ſeparate freely. The proportion of the ſcum ought never to exceed forty *per cent.* except when the liquor is very poor; if you uſe more, the liquor will be clammy and thick, which clogs the fermentation, and is very prejudical. The ſcum from the liquor clarified by St. Hill's precipitaters is very hurtful to the liquor, without it is uſed with care; and there is ſo little ſweets in it, that it is not worth the trou-

ble. The ſame gum that is ſo injurious to the ſugar, is alſo hurtful in the fermentation: By throwing the ſcum into a caſk, and putting a few gallons of water to it, after ſtanding ſome time, you may draw off what ſweets are in it.

Of the Qualities of Dunder.

Dunder is not only neceſſary to aſſiſt the fermentation, and by its ſharpneſs diſſolve the ſweets better than water, but makes an addition to the quantity of the ſpirit; the ſweets do not all diſſolve at the firſt fermentation, till the liquor being diſtilled, the boiling diſſolves the remainder, which adds to the liquor it is next fermented with; for this reaſon, there ought to be proper coolers to rack off the dunder, and loſe as little as poſſible. With proper coolers, there may be from ſixty to ſixty-five *per cent.* clear dunder; that is allowing twenty-five *per cent.* for evaporation, and from five to ten *per cent.* for ſediment. The dunder and ſcum being properly racked off before uſed, the liquor will always work off the ſooner, and make better returns, than the liquor that is ſet with the ſame materials unſettled. When the dunder and ſcum are not properly racked off before uſed, there will be a ſediment of thirty or forty gallons in the bottom of the

the fermented liquor, which muſt either be thrown away, or if put in the ſtill, will incruſtate on the ſides and bottom, burn the ſtill, and give the ſpirit that diſagreeable burnt taſte which is often unjuſtly attributed to the uſe of dunder. Dunder that has been ſtanding from one crop to another ought never to be uſed; it undergoes the acetous, and enters the laſt ſtage, the putrefactive fermentation, which is ſo hurtful to the ſpirituous.

The Quality of Melaſſes.

The only method to try the quality, is to let it drop on the nail of the thumb and if it is good, it will remain in a globular form and diaphanous; but, if weak, will run off, and appear of a whey colour. By being ſure of the quality, the diſtiller is certain of his proportions; good melaſſes commonly weigh from nine and a half to ten pounds *per* gallon. This method is of eſſential ſervice to either planter or merchant. The melaſſes ciſtern ought to be terraced with ſtrong mortar, for if made of wood, the planter meets with an inſenſible loſs in the courſe of the crop, for the following reaſons; the oily body, that melaſſes is impregnated with, acts as a menſtruum to reſinous and balſamic ſubſtances,

which the pores of moſt wood are full of; after diſſolving thoſe bodies, it paſſes through the void ſpaces; and what retaine an aqueous body, and oleaginous, will paſs.

The fermenting Part.

THE diſtillers firſt care is, to try what proportion of ſweets makes the beſt returns: Set from ten to fourteen *per cent.* which is as high as they ought ever to go; the ſtrength of the fermentation will not work off more than a certain proportion of ſweets; twelve *per cent.* therefore, will yield as much as fourteen *per cent.* ſometimes, and, by finding out the proportion, make better crops than uſual. Set always lower when you ferment with ſcummings than without them; the liquor is thicker, and does not ferment ſo freely with them as without. The return of proof ſpirit, if the proceſs is properly attended to, will be from ſixty-five to ſeventy-five *per cent.* Jamaica proof ſpirit, and double diſtilled from the hundred gallons of neat ſweets; by uſing a large fermenter, as before mentioned, you will have five *per cent.* more than in the common way.

The Quality of Water.

WATER has always been regarded as an element of great conſequence in moſt natural phenomena, capable of aſſuming a great number of forms, and of entering into numerous combinations. Natural philoſophers define it to be an inſipid, ponderous, tranſparent, inodorous, colourleſs, and highly fluid body, ſuſceptible of the different ſtates of aggregation, from ſolidity to that of elaſtic vapour. If we tranſport ourſelves, in imagination, into the vaſt receſſes of the interior parts of the earth, we ſhall again meet this element, acting in ſilence, in the formation of ſalts and chryſtals, and depoſiting them in the clefts of the rocks —it has been called the grand diſſolvent of nature; in fact, it unites with a great number of bodies, and, ſingularly, favours their mutual combination. The weight of the atmoſphere has a ſingular influence on the ebullition of water—in proportion as this weight is greater, ſo much the more does it oppoſe the tendency in the water to aſſume the form of vapour. This accounts for the obſervation of Fahrenheit, that the temperature of water, in a ſtate of ebullition, is not always the ſame. If the elevation of the mercury in the barometrical tube be attended to, it will be found that the temperature of boiling water is higher or lower,

lower, according to that elevation. By one of the moſt conſtant laws of the affinity of compoſition, it has a ſtronger tendency to combination in this ſtate, wherein its aggregation is the moſt feeble. Chymiſts have frequent occaſion to obſerve with what rapidity water, in the ſtate of vapour, diſſolves ſalts, ſoftens mucilaginous matter, corrodes and calcines metals, &c. and is condenſed when expoſed to a degree of cold, ſome degrees above the freezing point, as is ſeen in the falling dew.—I had an opportunity of ſeeing the ſilent element at work in a ſubterraneous cavern, in the Iſland of Antigua, near the Ridge: After deſcending the firſt apartment, I entered, and found it decorated with a *Sileſiaca Spar*, a genus of ſemipellucid ſtones; but upon proceeding to the ſecond and third apartments, found it to be an exhauſted *Crater*, and nothing appeared but the effects of a violent calcination, in which there was a prodigious quantity of *Veſpertillio Spectrum*, or bats, which made as much noiſe, as if a wind-mill had been at work in a gale of wind;—they were accompanied with that diſagreeable inſect the cockroach, which I imagined exiſted upon the excrement of the bats: This ſubterraneous cavern was between thirty and forty fathoms below the ſurface of the earth, and no appearance of the extent of it.

Pond-Water is much better for fermentation

mentation than either river or ſpring-water; it is not only ſofter, but there are a deal of vegetable juices, that are collected from the adjacent fields; ponds that receive the waſhing of mill-beds and cattle-pens are better than any other; the more vegetable juices water is impregnated with, the more menſtruous it acts, from the corroſive force of the extraneous bodies, which are commonly acid and alkalious ſubſtances; and, by the addition of thoſe, the mucous body is diſſolved, the acid's force in diſſolution, from being a ſharp longitudinal pointed particle, which ſubtilizes the liquor; for water in itſelf is an agent in chymiſtry, penetrating into all bodies, it is more volatile than acid, and acid leſs fixed than earth.

Of Stills.

Large ſtills have been moſtly approved of of late years; they require leſs fuel in proportion, ſave labour, and make a better ſpirit. The ſize uſed in Jamaica, is from nine to twelve hundred gallons for low wines, and from four to ſix hundred for rum. It is not only the ſmaller proportion of fuel, but the particles of fire act with more force on a large ſurface; and of courſe, the more diffuſed the ſurface of the liquor, the more points aſcend

aſcend; for evaporation is to be determined by the ſpecific gravity and an igneous impulſe; the two laſt motions act more copious in proportion to the extent of ſurface, and the diſſipation of the rariſied vapour. The capital of the elambic ſhould be as large as poſſible, as the actual effluvia is condenſed the ſooner; for the more compreſſed the volatile bodies are in the head, the more room there is for plentiful emiſſion of the rariſied ſpirit, being the firſt ſtage of tranſmutation. The gooſe-neck, or tube, which conveys the vapour into the ſerpentine pipe, ought to be as large as poſſible, in proportion to the capital, as there will be leſs oppoſition to the paſſage of the volatile body. The ſerpent ſhould conſiſt of nine or ten ſpherical turns, and be a ſize ſmaller than the gooſe-neck at the middle; for the larger it is, the more ſubtile ſpirituous vapour it will receive; and the more turns, the ſubject becomes more compreſſed; the ſtronger the ſpirit, the ſooner it is rariſied by heat, and the quicker tranſmuted by cold, the better, otherwiſe it retards the evaporation. The more expoſed the capital is to the ambient air, the volatile particles will be tranſmuted the ſooner.

Large ſtills will anſwer much better, where they have a ſufficient quantity of water—if not, the effluvia cannot be tranſmuted, but will be a great loſs to the Planter; ſo that in moſt of theſe Iſlands,

lands, ſmall ſtills anſwer by far the beſt —from three to ſix hundred gallons is ſufficiently copious. On the properties of Lord Romney, and Charles Spooner and Daniel Mathews, Eſquires, (in St. Kitt's), large elambics will be of the utmoſt utility, for the before mentioned reaſons. Small ſtills ſhould have the ſerpentines in proportion to the above—the ſame with the receivers.

Reſervoirs for the Serpentines.

RESERVOIRS in general are made too ſmall, ſo that they ſoon heat, and heat the walls, which not only injures them, but they retain it, and heat the cool water when put in, and by running off the ſpirit warm loſe conſiderably. The reſervoirs ought to contain more water than could be heated to any great degree by diſtilling, and, by adding ſome cool water once a-day, keep the ſpirit cool. The reſervoirs ſhould be no deeper than juſt to cover the ſerpent to the gooſe-neck, as it is the perpendicular height that makes the weight of water.

A reſervoir for the ſerpents of two ſtills of nine hundred or ſix hundred gallons, ought to be fourteen feet wide, and on the outſide of the ſtill-houſe; and by having gutters round part of the works to lead into it, will be well cooled every ſhower that falls in the crop.

For the information of young diſtillers, I will here give them a copy of the ſtill-houſe book, for keeping an account of the ſweets made uſe of, and the returns of ſpirits.

Date.	No. of cifterns.	Sum *per cent.*	Average *per cent.*	Diſt. *per cent.*	Sum *per* cifterns.	Melaſſes *per* cifterns.	Total of Summings.	Total of Melaſſes.	The proportion the Sum bears to the Melaſſes.	Sweets reduced to neat Sweets.	Remarks on the Weather and ſtrength of the Liquor.

The different proportions of ſetting from 10 to 14 *per cent.* ciſterns 1000 galls.

1	35	5	50	15	300	50			6 to 1	50	at 10 *per cent.*
2	35	6	45	14	300	60			7 to 1	50	at 11 *per cent.*
3	40	7	40	13	300	70			8 to 1	50	at 12 *per cent.*
4	45	8	55	12	250	80			9 to 1	50	at 13 *per cent.*
5	40	9	50	11	200	90			6 to 1	50	at 14 *per cent.*
6		4	65	25		140	1550	890			No. without ſummings.

Date.	Number.	Age.	Low Wines *per* ciſtern.	Low Wines *per cent.* extracted.	Total of Low Wines extracted.	Low Wines diſtilled *per* day.	Total of Low Wines diſtilled.	Rum *per* day.	Rum *per cent.*	Total of Rum extracted.	Low Wines from the Rum ſtill.	Strength of the Rum.

How

How to make Rum for particular Uſe.

GREAT care ought to be taken to obſtruct the evaporation of oleaginous bodies with the ſpirituous. The firſt is the ætherial, and by ſome called eſſential oil; this is a fine ſubtile body, approaching nearly to the nature of ſpirit, which retains the flavor of the plant. This oil evaporates along with the ſpirituous body, at the beginning of diſtillation. To prevent this union, return the two firſt gallons of ſpirit, which contain the greateſt part of this fœtid oil, into the low-wine butt; by this ſeparation, the ſpirit loſes its diſagreeable flavor, at the latter end of diſtillation. When the ſpirit is nearly finiſhed, there remains the empyreum oil, which is that ſubſtance that occaſions the ſpirit having an offenſive burnt ſmell and taſte. The diſagreeable flavour that rum hath, is owing to the combination of thoſe bodies. Some of our ableſt chymiſts conſidered this oil as an extraneous matter, impreſſed or added by the fire; this oil, even in aromatic plants, ſtinks intolerably: The chymiſts uſe alkali for alcholizing ſpirituous bodies, the fixed vegetable ſalt being a great abſorbent to both the acid and oily particles, by the admixture of thoſe ſalts in proportion to the ſize of the alambic, they being naturally indi-

viſible particles by any agent that can be employed. They are ſpongy bodies, and abſorb all oily ſubſtances, and precipitate by this inteſtine motion; the rarified vapour gets neutral, by the help of alkalious ſubſtances.

I ſhould adviſe the Planter or Diſtiller, who wants rum for a particular uſe, to put up the middle runnings of low wines by themſelves, and diſtil them ſingly, and obſerve the ſame in diſtilling the rum; and by doing ſo, the moſt part of the offenſive taſte may be by the admixture of alkali, as all ſalts unſkilfully uſed are liable to impregnate the ſpirit with a urinous ſtate.

How to make the fixed vegetable Alkali.

TAKE the aſhes of the works during crop, but in particular thoſe of the ſtill-houſe, as all green wood produces the moſt ſalts: Make a *lixivium* of the calcined wood, in any veſſel agreeable to the fancy of the Planter; make a hole in the bottom of the veſſel, in proportion to the ſize, let the *lixivium* ſtand two days, then move the plug in the bottom, that has been cloſed during the diſſolution of the ſaline particles, ſo that it may filter into the veſſel put at the bottom; after the filtration, take a ſpare boiler, put in the ſaline

ſaline liquor, and make fire thereunder, to keep it ſimmering, until the aqueous body is evaporated, and the indiviſible is neutral; for no fire, although the only catholic diſſolvent, is able to diſſolve this terreſtrial and inanimate particle. After the menſtruum is evaporated, take out the alkali which is at the bottom, and apply to any excoriated part of the body, or to the tongue, it will have a ſtrong pungent taſte, according to the quantity of ſaline particles it is impregnated with; after this put the alkali into a cloſe veſſel, ſo that it cannot be reduced *per deliquium*.

A calamity which attends the Iſlands of Saint Chriſtopher and Nevis, and which is not to be met with in any other of the Weſt-India Iſlands, is a deſtructive ſpecies of one of the baſeſt of all animals, which proves very injurious to the vegetable kingdom.——On all the mountain lands, this diabolical genus of animals, *Simia*, of the firſt claſs *Mammalia*, and of the order *Primates*, abound: This ſpecies of monkey, altho' he belongs not to the human, yet he is capable of imitating ſome of our actions. The havock this baſe creature occaſions in theſe two unfortunate Iſles, is aſtoniſhing; they have a great ſhare of the other late calamities, with the above added to them. The eſtate of Walter Niſbet, Eſquire, in Nevis, and all the mountain lands in Saint Kitt's, ſuffer to an aſtoniſhing

niſhing degree; the canes and negroes proviſions are very much deſtroyed; and theſe deſtructive animals have ſo great a ſhare of human underſtanding, and travel in ſuch troops, that the poor ſlaves dare hardly attack them. Whether this monkey is indigenous of thoſe Iſlands, or was only brought there by accident, no Naturaliſt has yet accounted for; nor do I ſee Linnæus take notice of it in the *Syſtema Naturæ*.

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A GLOSSARY,

EXPLAINING THE

TECHNICAL TERMS, &c.

USED IN THE FOREGOING TREATISE.

A

ACETOUS—four.
Acuminated—ending in a point.
Alburnum—the pith.
Annuli—ſections of the *Larva*.
Anthera—the ſummit of the *Stamina*, bearing the *Pollen*, and is a part of the principal male organ of generation.
Apex—the top or ſummit.
Aptera—the fourth claſs of inſects, without wings.
Arborium—a name of one of the ſpecies of fern tree.
Artocarpus—the bread-fruit tree of *Otaheite*.
Auns—the beard of graſſes.
Avis—a bird.

C

CALYX—a flower-cup, which ſupports the organs of generation.
Cancer—a genus of the claſs *Aptera*, having eight feet, two claws, two eyes for the moſt part pedunculated and moveable, two feelers, and an articulated tail unarm'd.
Cancer ruricola—the land crab.
Caudex—the body of a tree.
Caudex ſimplex apice frondoſus—a ſingle body, with a leafy top.
Caudex ſpinoſum—a prickly body.

Corolla

Corolla—a leaf or crown, one of the ſeven parts of fructification.
Corpuſcles—the ſmalleſt particles.
Cryptogamia—hidden marriage, the twenty-fourth claſs of the vegetable world.
Culmus—a reed or ſtraw, the ſtem or trunk of a graſs.

D

DIGYNIA—the ſecond order of the claſs *Triandria*, containing two females in eachflower.

F

FARINA fœcundans—the fruitful male duſt of plants.
Filices—ferns, the firſt order of the claſs *Cryptogamia*, and one of the ſeven families of the vegetable kingdom.
Formica—an ant.
Formica minima Saccharivora—a genus of the claſs *Hymenoptera*; the ſmall ſugar ant, its body covered with white ſpots.
Formica Omnivora—a genus of the claſs *Hymenoptera*, a very ſmall ſcaly body; inhabits the root of the cane.

G

GENUS—an aſſemblage of plants.
Geniculatus—jointed ſtalks.
Germen—a bud, the baſe of the *Piſtillum*, the rudiment of the fruit.
Glires—the fourth order of the claſs *Mammalia*, having two fore teeth above, and two below, approaching each other, without fangs.
Gramen geniculatum—knotted graſs.
Gramina—graſſes, one of the ſeven families of the vegetable kingdom.

H

HORTUS—a garden.
Hybridous—a monſtrous production of two different ſpecies of plants, like the mule in the animal creation.
Hymenoptera—the fifth claſs of inſects, with four wings for the moſt part membraneous, and a prickly tail, but none in the males.

I

INDIA Orientalis—the Eaſt-Indies.

L

LANCEOLATED—lance-ſhaped.
Latibulum—a den.
Lepidoptera—a claſs of inſects having four farinaceous wings, a curled ſpiral tongue, and hairy body.
Lixivium—a lye made of aſhes.

M

MAMMALIA—the firſt claſs in the animal world, conſiſting of all thoſe animals which ſuckle their young.
Mariti tres in eodem conjugio—three males in the ſame conjunction.
Matrix—the womb.
Mel arundinaceum—the juice of the cane.
Mellivora—devourer of honey.
Minima—ſmalleſt.
Mucilaginous—full of ſlime or gravel.
Mus—the rat.
Mus amphibius, Mus major aquaticus &c.—the greater water rat, which inhabits *Europe* and *Africa*, in ditches, and at the roots of trees.

N

NECTARIUM—that part of the *Corolla*, which contains the honey juice; a new name, firſt given by Linnæus.
Niduli—ſmall neſts.

O

OLEAGINOUS—oily.
Ornithology—that diviſion of Natural Hiſtory which treats on birds.

P

PALMA Nobilis—palm: The ſex of plants is very well confirmed by an experiment that has been made on this tribe.
Panicula—a panicle, or looſe ſpike of graſs.
Papillæ—the paps of the caterpillar.
Pericarpium—a ſpecies of pod that contains the ſeed.
Phalæna Saccharivora—a genus of the *Lepidoptera*, with briſtly horns, diminiſhing by degrees from the baſe to the point, drooping wings often bent.
Pinnate—jagged.
Piſtillum—the ſtyle, or female organ of generation, whoſe office is to receive and ſecrete the *Farina fœcundans*.
Pollen—meal; the prolific powder contained in the *Antheræ*.

Polypodium

Polypodium—a genus of the *Cryptogamia*; the generic character consists in having round spots spread under its leaves.

Primates—the first order in the first class *Mammalia*.

S

SACCHARUM Officinarum—sugar-cane.

Saccharum spicatum—a specific name of the sugar-cane.

Sac. floribus paniculatis—sugar-cane with spiked flowers.

Sac. floribus spicatis; *Foliis undatis*—sugar-cane with spiked flowers, and waved leaves.

Salsola—a genus of plants.

Saponaceous—soapy, having the quality of soap.

Scirpus—a genus of the *Triandria*, with a downy husk, tiled.

Semen—seed.

Semen unicum oblongum, angustum acuminatum—a single oblong seed, narrow and pointed.

Sexus—Sexual; plants are distinguished by the sex of their flowers, which are either male, female, or hermaphrodite.

Simia—a genus of the class *Mammalia*, with four front teeth in each jaw, and a single fang on each side.

Simplex—simple, single.

Sochum—the bread fruit tree of *Java*, which grows in *Jamaica*.

Spica—a spike.

Stamen—the filaments that sustain the *Anthera*.

Stamina tria in flore hermaphrodite—three stocks in a hermaphrodite flower.

Stigma—*Apex* of the *Pistillum*.

Sui generis—of its own genus.

T

TRIANDRIA—a class of Linnæus, containing three males in one flower.

Trochilus—a humming-bird.

V

VALVES—partitions of the external cover of that sort of *Pericarpium*, called *Capsula*.